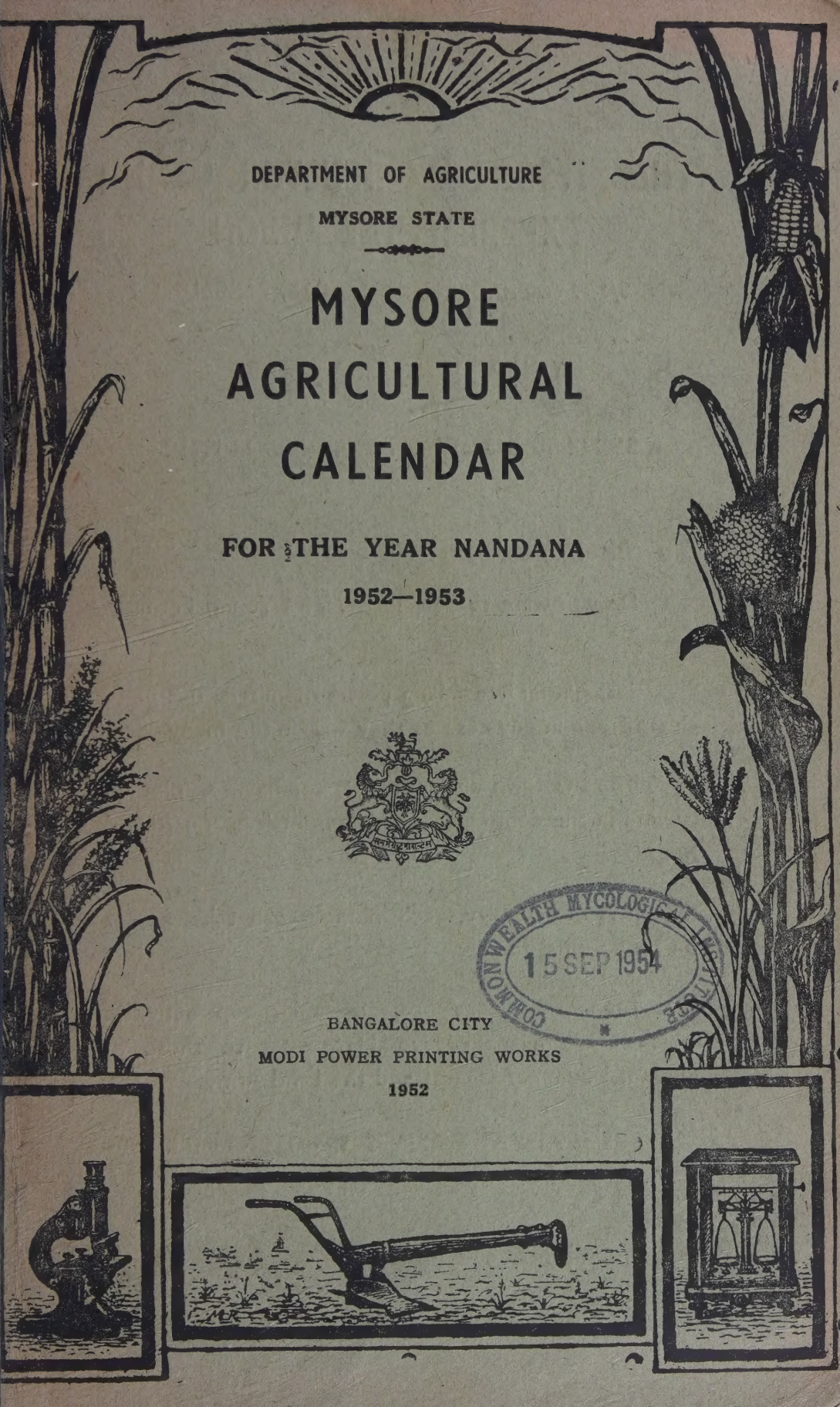




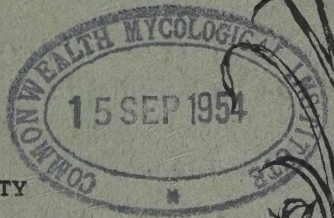
DEPARTMENT OF AGRICULTURE

MYSORE STATE

**MYSORE
AGRICULTURAL
CALENDAR**

FOR THE YEAR NANDANA

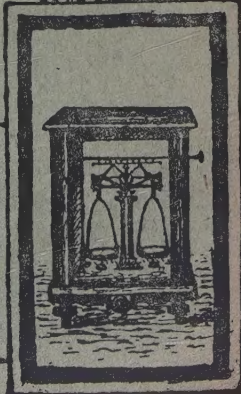
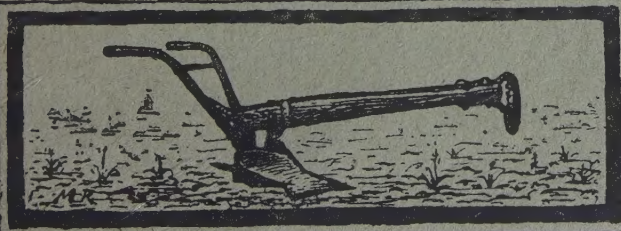
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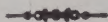
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(See back cover page 3)

DEPARTMENT OF AGRICULTURE

MYSORE STATE



**MYSORE
AGRICULTURAL
CALENDAR**

FOR THE YEAR NANDANA

1952—1953



BANGALORE CITY

MODI POWER PRINTING WORKS

1952

DEPARTMENT OF AGRICULTURE

MYSORE STATE

MYSORE AGRICULTURAL CALENDAR

FOR THE YEAR NABHANA

1925-26



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1925

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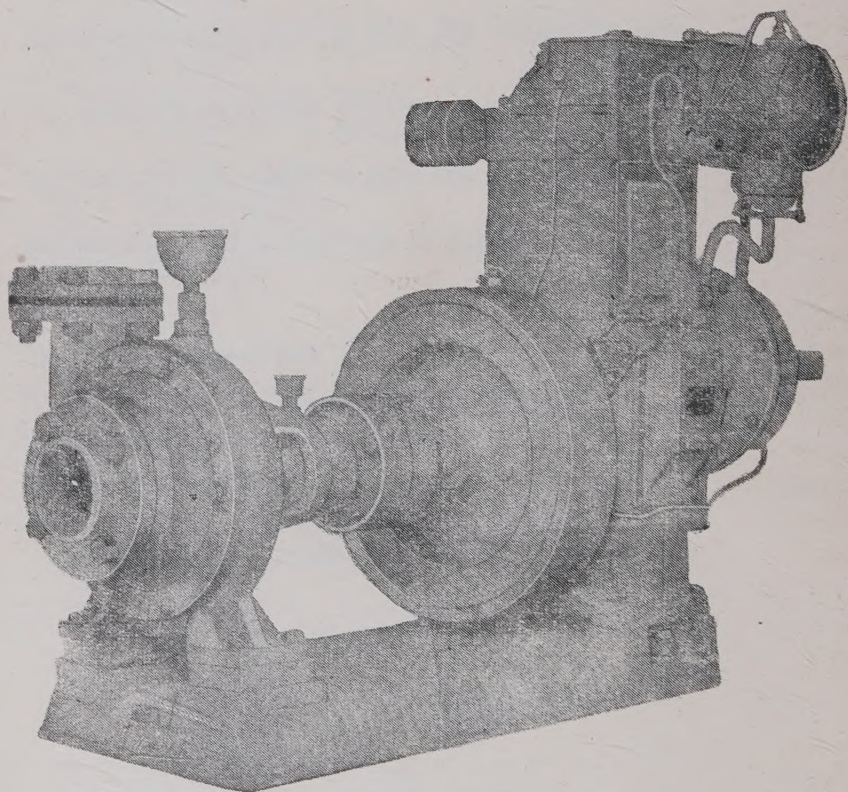
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THE MYSORE AGRICULTURAL CALENDAR, 1952

OUR MYSORE

Area	... 29,489 square miles.
Population	... 9,071,678. Density of population=308.
General elevation	... More than 2,000 feet.
Latitude	... Between 11°-38' and 15°-2" north.
Temperature	... 44°F to 100°F.
Rainfall	... Varies from 10" in areas of low rainfall to 300" in regions of excessive rain.
Primary occupation	... Agriculture.
Population dependent on Agriculture	Over 60%.
Chief rivers	... The Cauvery and the Tungabhadra.
Average annual area under crops	60-65 lakhs acres or $\frac{1}{3}$ rd of the total land surface.
Proportion of land irrigated	... One-sixth of our cultivated lands.
Proportion of land irrigated by tanks alone	One-tenth of our cultivated area.
Number of tanks	... More than 25,000.
Distribution of tanks	... One for every $1\frac{1}{2}$ square mile.
Area under food crops	... 54 lakhs of acres or about 82% of the area under all crops.

	Lakhs of acres (average)
Chief non-food crops of Mysore : Oil seeds	... 4.80
Cocoanut	... 1.70
Condiments and spices	... 1.80
Sugarcane	... 0.45
Fibres	... 1.00
Drug and narcotics	
including coffee	... 2.00
Miscellaneous	... 2.90

Normal exports : Til, mustard, cocoanut, onions, cardamoms, gur, sugar, coffee, areca, mangoes, potatoes, castor, chillies and cotton in some years.

Chief imports : Rice, pulses, coriander, turmeric, cotton, tobacco, ginger, plantains.

State just self-sufficient in other products in normal years.

Department of Agriculture first formed in 1898.

LIST OF DISTRICT HEADQUARTERS AND AGRICULTURAL RANGES

[The following list of district headquarters and ranges indicates how agricultural agents are at work in all the Taluks of the State.]

Districts and Ranges

BANGALORE—

Bangalore
Doddballapur
Anekal
Nelamangala
Hoskote
Channapatna
Kankanhalli
Magadi
Ramnagaram
Bidadi
Devanhalli

MYSORE—

Mysore
Nanjangud
Chamarajanagar
Hunsur
Krishnarajanagar
T.-Narsipur
Heggadadevankote
Gundlupet
Yelandur
Periyapatna

KOLAR—

Kolar
Bangarpet
Malur
Mulbagal
Srinivasapur
Chintamani
Siddlaghatta
Goribidnur
Bagepally
Gudibanda
Chikkaballapur

TUMKUR—

Tumkur
Kunigal
Gubbi
Tiptur
Chikkanayakanhalli
Turuvekere
Madhugiri
Sira
Pavgada
Kortagere
Amruthur

Districts and Ranges

MANDYA—

Mandya
Maddur
Malvalli
Seringapatna
Pandavapura
Nagamangala
Krishnarajpet

HASSAN—

Hassan
Arsikere
Belur
Alur
Holenarsipur
Arkalgud
Channarayapatna
Sakleshpur

SHIMOGA—

Shimoga
Honnali
Shikaripur
Sorab
Hosnagar
Sagar
Tirthahally
Channagiri
Bhadravathi

CHIKMAGALUR—

Chikmagalur
Kadur
Mudagere
Tarikere
Koppa
Narasimharajpura
Sringeri

CHITALDRUG—

Chitaldrug
Hiriyur
Molakalmuru
Davangere
Holalkere
Hosadurga
Jagalur
Harihar
Challakere

LIST OF VETERINARY HOSPITALS AND DISPENSARIES IN MYSORE STATE

Department of Animal Husbandry Services

BANGALORE DISTRICT		
1	Bangalore City	(Hospital)
2	Civil Station	"
3	Malleswaram	(Dispensary)
4	Hebbal	"
5	Kankanhally	"
6	Channapatna	"
7	Ramanagaram	"
8	Magadi	"
9	Doddaballapur	"
0	Nelamangala	"
1	Devanahally	"
2	Hoskote	"
3	Anekal	"
4	Yelahanka	(Rural Dis- pensary)
5	Kengeri	"
6	Kodihally	"
7	Kudur	"
8	Tyamagondlu	"
9	Vadigenahally	"
0	(Vijayapura)	"
1	Sarjapur	"
2	Gudemaranahalli	"
3	Nandagudi	"
4	Chennedevi aghara	"
5	Kaggalipura	"
6	Chikkabelavangala	"
7	Harohalli	"
8	Gunjur	"
9	Kodamballi	"
KOLAR DISTRICT		
1	Kolar	(Hospital)
2	Malur	(Dispensary)
3	Bowringpet	"
4	Kolar Gold Fields	"
5	Mulabagal	"
6	Srinivasapur	"
7	Chintamani	"
8	Bagepally	"
9	Gudibanda	"
0	Goribidanur	(Dispensary)
1	Chikballapur	"
2	Sidlaghatta	"
3	Vemagal	(Rural Dis- pensary)
4	Byrakur	"
5	Burudagunte	"
6	Batlapally	"
7	Pathapalya	"
8	Yellodu	"

19	Periyasandra Rural Dispensary
20	Sivarpatna
21	Ganjigunte
22	Lakshmipur
23	Manchenhalli
MANDYA DISTRICT	
1	Mandya (Hospital)
2	Srirangapatna (Dispensary)
3	Pandavapura
4	Krishnarajapet
5	Nagamangala
6	Maddur
7	Malavally
8	Basaralu (Rural Dis- pensary)
9	Arakere
10	Bookinkere
11	Kikkeri
12	Bellur
13	Bindiganavale
14	Koppa
15	Halagur
16	Santebachahalli
17	Melkote
18	Belagola
19	Belakavadi
MYSORE DISTRICT	
1	Mysore (Hospital)
2	T.-Narsipur (Dispensary)
3	Chamarajanagar
4	Gundlupet
5	Nanjangud
6	Heggadadevankote
7	Hunsur
8	Periyapatna
9	Krishnarajanagar
10	Bannur (Rural Dis- pensary)
11	Talkad
12	Yelandur
13	Ummatur
14	Kabbahally
15	Hura
16	Saragur
17	Hampapura
18	Bettadapura
19	Saligrama
20	Palace Body Guard Veterinary Dispensary
21	Mirle Rural Dispensary
22	Ravandur

23	Bilikere	(Rural Dispensary)	8	Shikaripur	(Dispensary)
24	Chamundipuram	"	9	Honnali	"
25	Terakanambi	"	10	Channagiri	"
26	Tagadur	"	11	Thagarthi	(Rural Dispensary)

HASSAN DISTRICT

1	Hassan	(Hospital)	12	Mandagadde	"
2	Saklespur	(Dispensary)	13	Humcha	"
3	Arakalagud	"	14	Nagar	"
4	Alur	"	15	Kumsi	"
5	Belur	"	16	Anavatti	"
6	Arsikere	"	17	Shiralakoppa	"
7	Channarayapatna	"	18	Kulambi	"
8	Holenarasipura	"	19	Nyamathi	"
9	Gorur	(Rural Dispensary)	20	Santhebennu	"
10	Ramanathapura	"	21	Kariganur	"
11	Rayarakoppal	"	22	Tavarekere	"
12	Yeslur	"	23	Holehonnur	"
13	Ballu	"	24	Hitla	"
14	Banavara	"	25	Ripponpet	"
15	Nuggehalli	"			
16	Hiresave	"			
17	Sravanabelagola	"			
18	Hallimysore	"			
19	Doddamettikurike	"			
20	Hettur	"			
21	Anathi	"			
22	Didaga	"			

CHITALDRUG DISTRICT

1	Chitaldrug	(Hospital)
2	Davangere	(Dispensary)
3	Harihar	"
4	Jagalur	"
5	Molakalmuru	"
6	Challakere	"
7	Hiriyur	"
8	Hosadurga	"
9	Holalkere	"
10	Bharamasagar	(Rural Dispensary)
11	Mayakonda	"
12	Malebennur	"
13	Rampura	"
14	Bydareddihally	"
15	Yerahally	"
16	Srirampura	"
17	Hariabbe	"
18	Turuvanur	"
19	Bilichodu	"
20	Malladihalli	"
21	Relagaru	"

CHIKMAGALUR DISTRICT

1	Chikmagalur	(Hospital)
2	Mudigere	(Dispensary)
3	Koppa	"
4	Narasimharajapur	"
5	Tarikere	"
6	Ajjampur	"
7	Kadlur	"
8	Kalasa	"
9	Sringeri	"
10	Bandigadi	"
11	Balehonnur	"
12	Hunsaghatta	"
13	Jannapura	"
14	Lingadahally	"
15	Kattinammane	"
16	Sakrayapatna	"
17	Aldur	"
18	Hirenallur	"

SHIMOGA DISTRICT

1	Shimoga	(Hospital)
2	Sagar	"
3	Bhadravati	(Dispensary)
4	Anandapuram	"
5	Thirthahally	"
6	Hosanagar	"
7	Sorab	"

TUMKUR DISTRICT

1	Tumkur	(Hospital)
2	Kunigal	(Dispensary)
3	Gubbi	"
4	Turuvekere	"
5	Tiptur	"
6	Chiknayakanahally	"
7	Sira	"
8	Pavagada	"
9	Madhugiri	"

10	Koratagere	(Dispensary)	17	Kodigenahally	(Rural Dispny.)
11	Nagavally	(Rural Dispensary)	18	Thovinkere	"
12	Amrutur	"	19	Bukkapatna	"
13	Hagalavadi	"	20	Huliyar	"
14	Nonavinkere	"	21	Mayasandra	"
15	Y. N. Hoskote	"	22	Seetakal	"
16	Neralakere	"	23	Huliyurdurga	"
			24	Mavinahally	"

LIST OF HORTICULTURAL NURSERIES AND SALES DEPOT

Bangalore District	...	Government Botanic Gardens, Lalbagh.
Mandya District	...	Dar-ul-Dowlat Bagh, Srirangapatna and Brindavan Gardens, Krishnarajasagara.
Mysore District	...	Curzon Park and other Nurseries in Mysore.
Hassan District	...	District Horticultural Nursery Hassan.
Chitaldrug District	...	District Nursery, Iyyanahalli, Chitaldrug.
Chikmagalur District	...	District Nursery, Chikmagalur.
Shimoga District	...	District Nursery, Shimoga.
Tumkur District	...	District Nursery, Somanakatte, Tumkur.

FARMS

Basic studies on crops begin in the laboratory and the pot culture house. Results obtained therein are tested under field conditions on the Experimental Stations and Farms. Hence a keen agriculturist visits both the laboratory and the experimental farm and takes interest in the problems being pursued there. The results of the experimental farm in turn are brought closer and closer to the raiyats' field by various means. Promising strains for example are taken out of the breeding plots when they have given encouraging results for at least three years and then tested on the farms for some years to study their average performance. In every case the strains are tested against a local standard variety and the treatments are replicated several times to make an allowance for variation in soil fertility, etc. Strains that have done well in the rigorous tests are sent out to the districts for preliminary trials. Usually two or three strains which are likely to succeed are tested in each locality. The best of them, the one which satisfies the local requirement is released for general distribution. In the first instance the selected seed is sown on a private estate on one or two acres, cultivation, roguing harvesting, and threshing are done under the general supervision of the Department. Such farms are termed by the Department as "A" grade farms. If the seed produced is good and it satisfies the purity, germination and vigour tests, it is certified fit for seed purposes. The grower is given a premium of 10 per cent for his trouble. Seed from the "A" grade farms is distributed to several selected growers for demonstration plots to demonstrate the superiority of departmental strains or recommendations. Improvement of varieties is just one of the items that is carried out in the experimental farms. Improvements in respect of manuring, cultivation, etc., are also pursued.

The four main agricultural farms in Mysore are at Hebbal, Babbcor, Nagenhally, and Mandya-V. C. Farm.

The Central Farm at Hebbal, one of the earliest to be started is situated five miles from Bangalore on the Bangalore-Bellary Road. The postal address

is Hebbal, Bangalore-6. Experiments are conducted there on monsoon ragi, groundnut, sugarcane, and summer paddy. The best time to visit the farm is October, November for dry land crops and November, December for irrigated crops. The farm is now attached to the Agricultural College. Enquiries regarding the Farm may be addressed to the Principal, Agricultural College, Hebbal, Bangalore-6.

The Government Experimental Farm at Babboor is situated 3 miles from Hiriur, a Taluk Headquarter Town in Chitaldrug District. It is 100 miles from Bangalore, on the Bangalore-Bellary Road. Experiments are conducted on cotton, jola (sorghum), sugar-cane, coconut and other crops at the Farm. The Farm is designed to meet the requirements of the Black Cotton Soil tract and the irrigable lands, under the Vani Vilasa Sagara Reservoir. The most suitable time to visit the Farm is December—January. Enquiries may be addressed to the Assistant Director of Agriculture, Government Experimental Farm, Babboor, Hiriur Post, Chitaldrug District, or Director of Agriculture in Mysore, Bangalore.

The Farm at Nagenhally, 5 miles from Mysore City, on the Mysore-Bangalore Road, is the main Paddy Breeding Station for the Department. A very suitable period for visiting the Station is October, November. Enquiries may be addressed to the Senior Assistant Botanist, Paddy Research, Gandhinagar, Bangalore or to the Director of Agriculture.

The Visvesvaraya Canal Farm (at Gandhal) is situated 7 miles from Mandya, the headquarters of the district of that name, on the Bangalore-Mysore Road. It is the biggest Farm in the State extending over 600 acres. Designed to conduct investigations on sugar-cane and many other alternative crops suited to the Visvesvaraya Canal area, the Farm handles a large number of problems. It has been the venue of the Visual Instruction programme for selected raiyats from all over the State for the past few years. October and November are the best months for visiting the Farm. Enquiries may be addressed to the Superintendent, Visvesvaraya Canal Farm, Mandya, or the Director of Agriculture in Mysore.

Two regional Farms have been established one near Chamarajanagar in the Mysore District and another at Yelavare near Arsikere in the Hassan District. Visits may be arranged by the Assistant Directors of Agriculture of the Districts.

Farms are attached for instructional purposes to the four Kannada Agricultural Schools at Ramakrishnapura in the Bangalore District—18 miles from Bangalore and 6 miles from Anekal—; at Chikkanhally in Tumkur District—5 miles from Sira, towards Bangalore on the Bangalore-Bellary Road—; at Somanahally in Mandya District,—one mile from Maddur on Bangalore-Mysore Road—; and at Garudapalya in Kolar District, 2 miles from Narasapur on Bangalore-Kolar Road—; correspondence regarding these may be addressed to the Assistant Directors of Agriculture of Bangalore, Tumkur, Mandya and Kolar respectively.

For seed multiplication basic seed farms have been established. These are laid on lands taken on lease and specially devoted to growing particular strains of paddy required for the various districts. Enquiries regarding them may be addressed to Assistant Directors of Agriculture of the different districts.

A very important link between the farms such as the ones mentioned above run by the Department, and the raiyats' field, is the co-operative undertakings that have been organised from time to time. This co-operation may take one or the other of these forms.

SUBVENTION FARMS

- (1) In co-operation with progressive agriculturists selected strains and recommendations are tried on their holdings in different localities. Each of them may be given a small grant as compensation for the risks of experiment. These co-operative plots are known as Subvention Farms.
- (3) Conclusions might have been arrived at with regard to certain strains of seed (or a particular manural formula or implement or schedule of cultivation) and no further experimentation may be necessary; what is required may be only popularisation. A free sample will, in that case, be given to a farmer for trial. The farmers' plots on which the co-operative trials are made are known as Demonstration Plots.

The stress may be, not on the experimental side, but on the side of seed multiplication, etc. In this case

- (1) The source material may be a quantity of seed of a proved strain from an Experimental Farm or a Basic Farm.
- (2) The quantity of seed so issued is grown on an agriculturist's farm. The seed is issued to him free on condition that for every hundred seers of seed taken by him he will return not less than 110 Srs; and further any quantity of pure seed he will be requested to supply will be purchased at a premium over the market rate for that grain. This is a co-operative seed multiplication plot.
- (3) The seed from a Basic Farm may be distributed amongst a number of select growers and they may among other conditions be paid a small grant of Rs. 10 per acre. Such a plot which the farmer sets apart for multiplying the Basic Farm seed is known as a Subsidised Plot.

Assistant Directors of Agriculture of the particular districts may be addressed for enquiries regarding these co-operative plots.

Besides by the Department of Agriculture or by the Department of Food Production, Farms are run by other agencies. Under Animal Husbandry Department there is the Composite Farm at Hessarghatta (Bangalore District) and the Cattle Farm at Ajjampur (Chikmagalur District). There is a Fruit Research Station also at Hessarghatta, enquiries regarding which may be addressed to the Economic Botanist, Department of Agriculture, Seshadri Road, Bangalore-1. Enquiries regarding Horticultural Farms may be addressed to Superintendent, Government Gardens, Lalbagh, Bangalore-2. There are a number of Farms again under the Department of Sericulture. The Indian Dairy Research Institute at Bangalore is an All India Organisation for Dairy problems. Coffee problems are handled at the Coffee Experiment Station, Balehonnur P.O., Chikmagalur District under the Indian Coffee Board.

A BRIEF NOTE ON THE DEPARTMENT OF HORTICULTURE AND ITS ACTIVITIES IN THE STATE

Introduction

The Department of Horticulture is one of the oldest institutions of the State. The origin of Lalbagh dates back to Hyder's times. Lalbagh became the centre of horticultural activities in 1856. Since then the activities of the Department have developed in leaps and bounds. Under the able guidance of late Mr. C. J. Cameron (1874-1908), Mr. G. H. Krumbiegel (1908-1932) and Rao Bahadur H. C. Javaraya (1932-1944) the Lalbagh was extended from about 30 acres to over 135 acres, a number of new parks were laid out, and a considerable amount of work has been done by them in the introduction and distribution of plants of economic value to the State; and the development of horticulture and economic works was organised by them from time to time. Apart from the Botanic Gardens, Lalbagh, the department has under its control extensive parks and gardens such as Jaya-Chamarajendra Park at Bangalore and Gorden Park and Sri Chamarajendra Zoological Gardens at Mysore, Horticultural Farms at Bangalore and Maddur, the renowned Brindavan Gardens at Krishnarajasagara, Gumbaz Gardens and Dar-ia-Dowlat Bagh at Srirangapatna and more than 400 parks and gardens in the State including the parks and gardens of Palace, besides the two hill stations, Nandidrug in Kolar District and Kemmangandi in Bababudan range.

INTRODUCTION OF PLANTS OF HORTICULTURAL AND ECONOMIC IMPORTANCE—PROGRESS

During the Second World War the Department lost contact with several botanical and horticultural institutions in India and abroad. Attempts are being made to renew the contact and import improved varieties of fruit plants from tropical and sub-tropical countries. It is also under consideration to organise the systematic introduction of plants of economic value such as oil, perfumes, resin, gum, dye and tan yielding plants and fodder grasses. Some varieties of South African guavas treated with colchicine were donated by Dr. E. K. Janakiammal of Royal Horticultural Society Gardens, Wisley Surrey, England, and are under trial cultivation in the fruit nursery.

DEVELOPMENT OF HORTICULTURE IN THE STATE

The fig cultivation in Ganjam which was famous at one time has of late declined and it is now revived and demonstration plots have been laid out to facilitate the revival of the fig industry bringing home to the growers the utility and advantage of correct method of cultivation through ocular demonstration and about 6 acres are brought under fig cultivation. This is having a salutary effect and the old industry is fast reviving. Opening of regional stations for Pomegranate at Madhugiri and Chintamani, for Pomelo and vegetables at Devanhalli, for Mangoes at Srinivasapur and Kolar, for Bananas at Nanjangud, and for Orange and Pineapple in Malnad areas of the State are under the active consideration of the Department.

PATCHOULI CULTIVATION

As one of the postwar schemes, the Government have sanctioned a scheme for the extensive cultivation of Patchouli at Krishnarajasagara and it has been grown in 6 acres, the oil of which is largely used industrially in the manufacture of soaps, oils, scents and other perfumery and toilettes.

FRUIT CULTURE

The Horticultural Department which has dealt with fruit culture over a century has been devoting special attention to the encouragement of fruit cultivation in the State. Experimental work on fruit culture is carried on mainly in the Government Botanic Gardens, Lalbagh, and Experimental Orchard at Krishnarajasagara.

VEGETABLE PRODUCTION

The attempt to develop vegetable production is a continuation of the measures which have been undertaken by the department in this direction in the past. As long as 1908, the Department established the Horticultural Farm at Bangalore, as the earliest of its kind started in India. In recent years two more farms have been established one at Koramangala near the Indian Dairy Institute, Bangalore, and the second one, at Maddur, for the production of vegetables (both indigenous and exotic) and vegetable seeds on a commercial scale. These farms serve as centres of work on vegetable culture.

DISTRICT NURSERIES

District Nurseries to meet the demands of the several developmental schemes have been opened in all the districts of the State except Kolar and are in various stages of progress and development. It was not possible to open one at Kolar as a suitable site for a nursery has yet to be acquired. A large number of seedlings of indigenous fruit plants such as mango, guava, jak, etc. and fuel and avenue plants were raised in the nurseries during recent years and distributed to the several agencies working under the Rural Development Schemes in the State. The Nurseries at Lalbagh and Krishnarajasagara have continued to play their major role in supplying good seeds and seedlings to these District Nurseries and the public.

Facilities.—At each District Headquarter, a District Horticultural Inspector along with Fieldman and Plant Propagator are posted to advice and demonstrate fruit and vegetable cultivation to the public and their services are very much made use of by the rural and urban cultivators of the several districts. These personnel are taking active part in Rural Development Schemes and meetings and render all technical help to make such endeavours a success; the District Horticultural Inspectors also help the raiyats to get their seeds, seedlings and fruit plants, fruit loans, electric pumps and other necessities for intensive cultivation of fruits and vegetables. The Fruit Canning and Co-operative Marketing Society is also helping towards creating marketing facilities for the cultivators.

HEALTH RESORTS

The Health resorts at Nandi Hills and Kemmangandi are being improved and are becoming very popular. Very recently communication and conveyance facilities have been improved by providing frequent Motor Van services to the top of the hills. It is under active consideration to open some more health resorts in places like Jogi Mutti (Chitaldrug District) and Devarayana-durga (Tumkur District).

PROGRESS IN ADMINISTRATION

The Government having realised the usefulness and the importance of horticulture in the State and with an object of promoting the horticultural industries were pleased to re-organise the Department at a total cost of Rs. 2,81,216 vide G. O. No. AF 691-92/GG 92-46-3 dated 13-8-1947. As a result of this reorganisation, the Department covers every part of the State

as advisory, informative, instructive, and demonstration machinery of Government. A District Horticultural Inspector along with necessary staff has been placed in each District Headquarters who looks to the development of horticulture in all its aspects. As the work of the department at Bangalore, Mysore, and Srirangapatna, are elaborate and concentrated three Assistant Superintendents have been placed in charge of the work in these areas vide G.O. No. AF 6321-2/GG 36-50-2, dated 26-10-1950.

As the question of improving the Tourist traffic in India is engaging serious attention of Government of India, the Department of Horticulture is bound to play a very important role which will in the long run get additional revenue by way of this traffic to the State.

LIAISON ASSOCIATIONS

Recognising the need for an association of the Departmental workers and progressive agriculturists to act as a link between the Department of Agriculture and the farmers in general, the Mysore Agricultural and Experimental union was started as long ago as 1918-19. Several outstanding results of the Departmental work have passed to the farmer's field through trials conducted on the members' fields. The Field Days of the Union and discussions carried on under its auspices have made considerable contribution to the Extension Service of the Department.

From the beginning the Union has published two periodicals, one a Kannada monthly, (for the past few months being published once in two months) and an English quarterly.—“The Mysore Agricultural Journal.”

The membership of the union is about 3,000; there are nearly 80 life members at present.

A development of the recent years is the formation of the District, Taluk and Hobli committees. This has been done to enable the local members to meet more frequently than used to be possible previously and plan out Field Days and other programmes so as to make them more appealing and useful to all of them.

The union at the Hobli level has the prospect of being a compact body and stress has been laid in the latest discussions that these Hobli branches of the union should work in closer contact with the Multipurpose Co-operative Societies, so that it may be possible to give a material shape to the suggestions that evolve at the local union meetings.

The most recent move in the line of Union work is the formation of Student Farmers' Clubs. A number of them are already functioning in the districts.

These are now the objectives of the Union.

1. An increased activity of the regional committees of the Union.
2. Holding more and more of local Field Days as a main programme of the increased activity.
3. Attempting to make the Field Days more objective by arranging shows along with the field days exhibiting products produced by the local members.

4. Sponsoring co-operative enterprise in the various localities with reference to agricultural requirements.

5. Formation and development of Students Farmers' Clubs.

Join the Mysore Agricultural and Experimental Union.

Admission ... Re. 1.

Annual Fee ... Rs. 3.

Life membership ... Rs. 100.

Contact your local agricultural officers.

Address :

Secretary,

The Mysore Agricultural & Experimental Union,

5/1, Jaya Chamarajendra Road, Bangalore-2.

THE MYSORE AGRICULTURAL AND EXPERIMENTAL UNION

(Registered under Act II of 1904 and Act V of 1939.)

Constitution and Rules

1. *Name.*—The name of the Association shall be 'The Mysore Agricultural and Experimental Union' in English and 'ಮೈಸೂರು ವ್ಯವಸಾಯ ಸಂಘ' Mysooru Vyavasaya Sangha' in Kannada.

2. *Jurisdiction.*—The sphere of activity of the Union shall extend to the whole of the Mysore State.

3. *Headquarters.*—The headquarters of the Union shall be at Bangalore. Each District, Taluk and Hobli will have a branch of the Union comprising of the Union Members in the District, Taluk or Hobli. The headquarters of the branches will be located in the respective District, Taluk and Hobli headquarters.

4. *Objects.*—The object of the Union is to improve the agriculture of the country, comprising of crops, livestock, fruits and vegetables and other branches of farming, and thereby to improve the economic condition of the farmer.

The work of the Union will consist of the following items in accordance with the above object :—

(a) to spread a knowledge of scientific farming among the raiyats by propaganda and exhibitions.

(b) to arrange for agricultural tests in the holdings of the raiyats with the help of the Agricultural and allied Departments.

(c) to bring regional problems to the notice of the Director of Agriculture and the heads of other Departments and considering remedies.

(d) publishing a Kannada Journal and an English periodical dealing with agricultural topics, publishing popular bulletins on agriculture, livestock, fruits, vegetables and relates topics.

(e) providing the members with books and periodicals, dealing with agriculture and allied subjects.

(f) arranging for annual meeting of members and organising other meetings and conferences.

(g) undertaking all other items of work in pursuance of the object of the Union.

5. *Membership.*—The membership of the Union shall be open to (a) agriculturists and others interested in the development of agriculture in the State and

(b) members on the staff of Agricultural and allied Departments.

Every applicant for admission shall pay an admission fee of rupee one and an annual subscription of rupees three or such amount as may be fixed by the Union from time to time. Every member gets a copy of the Kannada Journal of the Union.

The Union year is from April to March next (both months inclusive).

The membership of any individual commences from the 1st of April in each year. If however a member joins in the middle of any year and pays the next year's fees in advance, only that much will be taken from him as fees for the first year as is proportional to the fraction of the year.

The term of commencement applies only to the membership fee and not to subscription to the Journal apart from membership. Subscriptions commence from any issue of the Journal either Kannada or English.

6. *Honorary Members.*—The managing committee of the Union is empowered to invite distinguished persons who have rendered service for agriculture in the State to be honorary members of the Union.

7. Such of the members as pay a lump-sum of Rs. 100 will be taken as life members of the Union.

N.B.—Each honorary or life member will get a copy of the English Journal as well as a copy of the Kannada Journal.

8. *Arrears.*—Members not paying their next year's fees for six months after the year for which the fees have been paid is over will cease to be members. If the fees are not received within 3 months of the close of the previous year, journals will cease to be sent to such members. The journals will again commence to be sent from the months in which the next payment is made. And the renewed membership will be considered to pertain to the year for which the payment of the fees would have counted, the same as if it were the first payment of the annual membership fee. If an individual desires to renew his membership 3 years after his ceasing to be a member, he shall pay a re-admission fee of rupee one.

9. *Management.*—The management of the Union shall be vested in a committee formed as follows. There shall be two members on the committee elected from each district, one vice-president elected by the general body, the ex-officio members mentioned hereafter, and 3 co-opted members. The Director of Agriculture in Mysore, the Principal of the Agricultural College, the Director of Animal Husbandry and Veterinary Services in Mysore, the Superintendent of Horticulture in Mysore, and the Deputy Director of Agriculture, Bangalore, shall be ex-officio members. There shall be two Secretaries, one Honorary Secretary elected out of the members enumerated above and another from the staff of the Department of Agriculture appointed as Secretary of the Union.

The Director of Agriculture in Mysore shall be ex-officio President of the Union.

Any member of the committee who is absent for three consecutive meetings without information will cease to be such.

Members who cease to be such by absence will be restored by the committee on giving reasons for the absence.

Any place falling vacant in the committee shall be filled by the committee.

10. *Functions of the Office-bearers*:—The President shall preside at all the meetings of the committee and of the general body. In cases of urgency the President shall have power to take such action as he may deem necessary without consulting the committee. The committee will however, be informed of the action taken at the next immediate meeting and its approval taken.

The Vice-President shall perform the duties connected with the day to day running of the union, and preside over the meetings of the union in the absence of the President.

The Deputy Director of Agriculture will be ex-officio Treasurer of the Union.

The Secretary appointed by the department shall manage all the correspondence of the union and shall be in-charge of all its records. He shall be responsible for their maintenance and preservation. He shall enter the minutes of all meetings of the union in a book specially kept for that purpose, separate books being maintained for the meetings of the committee and the general body. He shall convene all the meetings of the union under the direction of the President. He shall take the suggestion of Treasurer and be in charge of the funds of the union; and shall collect subscriptions, grant receipts and keep an accurate account of all receipts and expenditure.

He will be in contact with the local agricultural committees through correspondence and through tours to the spots and will generally look to the organisation.

The Honorary Secretary will look to the correspondence relating to the resolutions passed in the managing committee and the regional committees and keep contact with other institutions in consonance with the objects of the Union.

11. *Staff of the Union*:—The managing committee shall have power to appoint the necessary staff required for the work of the union.

12. *Editorial Board*:—There shall be an editorial board for conducting the English Journal and the Kannada Journal of the Union. It shall consist of 12 members of the union elected by the managing committee once in three years. The board shall appoint one of its members as the Editor of the English Journal and another as the Editor of the Kannada Journal. The Secretary of the union will be ex-officio Secretary of the board. Casual vacancies in the board may be filled up by the board.

13. *Meetings*:—(a) The committee of management shall meet not less than four times in a year and as often as necessary for the transaction of the business. At least a week's clear notice of meeting shall be given to the members. Five members shall form a quorum. If business cannot be transacted at a meeting for want of quorum, the meeting shall be adjourned to a subsequent date of which due notice shall have been given to all the members. The adjourned meeting shall transact only the business notified in the original meeting irrespective of whether there is a quorum or not.

(b) There shall be an annual general meeting of the union at which the Secretary shall present the annual report of the union, the audited statement of accounts of the previous year and the budget for the coming year for adoption by the general body. Elections to the committee of management will

be held at this meeting and the names of members elected to the Editorial board announced at this meeting. An auditor for auditing the accounts of the union will also be elected at this meeting.

Papers on the results of work done by the members may be read at the annual general body meeting provided they have been previously approved by the committee of management. Members who desire to bring up subjects for discussion or resolutions for adoption at the annual general body meeting of the union shall send in their papers or the subjects or copies of the resolutions to the Secretary a week previous to the meeting.

In the case of the annual general body meeting at least a clear fortnight's notice shall be given to the members.

One-third of the number of members on the rolls of the union or 20 members, whichever is less shall form the quorum.

If there is no quorum the meeting may be adjourned and due notice given to all the members of the adjourned date. Only the subjects on the original agenda may be discussed and business transacted at the adjourned meeting irrespective of whether there is a quorum or not.

Members in arrears of subscription for over three months at the date of the meeting shall not be entitled to send subjects or resolutions to the general body meeting and vote on them.

(c) The President shall have power to call extraordinary or special meeting of the committee or of the general body on a written requisition from not less than one-fourth of the members on the committee in the case of the meeting of the managing committee; and of not less than 50 members in the case of the general meeting. The extraordinary or special meetings shall be convened within a fortnight of the date of receipt of the application.

14. *Income and Expenditure*:—The income of the union shall consist of:—

- (a) subvention that may be granted by the Government.
- (b) admission fees.
- (c) membership fees.
- (d) other donations by members.
- (e) life membership fees.
- (f) subscription to Journals.
- (g) donations from district boards and local institutions.
- (h) miscellaneous receipts.

The funds of the union shall be deposited in Government Savings Bank and/or in the Bank of Mysore and/or in any other bank as may be approved by the managing committee. Expenses relating to the Field Day, the general meeting, purchase of furniture, etc., shall be sanctioned by the committee of management.

An imprest amount that may be sanctioned by the committee of management shall be held by the Secretary to meet contingent charges of the Union office.

No serviceable or unserviceable property of the union shall be disposed of without the approval of the managing committee.

Money for expenses shall be withdrawn by the Secretary from the Government Savings Bank and/or the Bank of Mysore and/or such other bank approved by the managing committee after obtaining the approval of the President or any member of the committee of management nominated by him.

The accounts of the union shall be audited annually by the Auditor to be appointed by the general body.

15. *Regional Committees* :—Regional committees are formed to serve the needs of the District, Taluk and Hobli branches of the union.

Each District Committee shall have a non-official President, two Secretaries, one the Assistant Director of Agriculture of the circle ex-officio and the other a non-official, and the number of members so chosen as to represent all the taluks in the District (2 or 3 per taluk). The District Veterinary and Livestock Officer and the District Development Officer will be ex-officio on the committee.

Each Taluk Committee shall have a non-official President, two Secretaries, one the Local Agricultural Inspector, ex-officio and the other a non-official, and a number of members so chosen as to represent all the Hoblies in the Taluk (about 15 to 20 members in all). The Veterinary Inspector of the Taluk and the Amildar will be ex-officio on the committee.

Each Hobli Committee shall have a non-official President, two Secretaries, one the Local Agricultural Inspector ex-officio and the other a non-official and 15 to 20 members representing the villages. The Local Veterinary Inspector and the Local Revenue Inspector will be ex-officio on the committee.

The work of the regional committees shall be in consonance with the objects of the union, according to local circumstances.

The Managing Committee of the union shall according as it is possible allot a portion of its funds to the District and Taluk Committees.

The District Committees shall send half yearly statement of accounts to the Central Committees along with the accounts of the Taluk and Hobli committees.

The District Committees shall meet about 6 times in the year, the Taluk Committees once a month and the Hobli Committees more often.

The Managing Committee of the union shall frame the necessary bye-laws for the regional committees.

16. *Dissolution of the Union* :—The union shall not be dissolved unless and until three-fourths of the members present vote for its dissolution in an extraordinary meeting called for that purpose, and such resolution is approved by Government.

APPENDIX.

1. *Elections* :—The District branches will severally elect two representatives each to the managing committee of the union.

The Vice-President shall be elected at the general body meeting.

The Honorary Secretary will be elected at the first meeting of the newly elected managing committee of the year.

2. *Staff of the Union* :—Regarding leave, etc. to be granted to the individuals of the staff rules as under Government will generally be followed.

3. *The Annual Conference* :—(a) The annual conference will generally be held once every year in the place fixed under the Presidentship of one chosen by the managing committee.

If the leaders of any of the branches of the union fix up their place for the conference and intimate the fact in writing to the Secretary, the subject will be considered by the managing committee and such a conference may be conducted after the approval of the managing committee.

The branch that invites the conference in its place may raise donations to meet the expenses of the conference.

(b) Both the managing committee of the Union and the committee of the local branch will arrange for the lodging of members attending the conference.

(c) The general body meeting of the Union shall be held in the place of the annual conference.

(d) The programme of the annual conference will extend over not less than 2 days.

4. *Allotment of funds and the branches* :—(a) As soon as a committee of a branch is formed the date of formation of the committee and the names of its members will be intimated to the central office of the union.

(b) The regional committee shall obtain the lists of members of the union in its region and other details from the central office and maintain the record.

(c) Each Taluk committee will be entitled to an allotment of five annas* for each member's subscription received during the current year in that Taluk and each District Committee will be entitled to an allotment of 0-3-0 annas for each member's subscription received during the current year in that district.

(d) Each regional committee will co-operate with local departmental officers in collecting subscriptions and remitting the collections to the central office of the union.

(e) Each regional committee will send a report of each of its meetings to the central office soon after each such meeting.

(f) The district branches will elect two representatives each to the managing committee of the union as detailed under elections.

5. *Suggestions of work to the central body and to the branches*—

(i) The following will be the line of works for the central body :—

(a) Publishing a Kannada monthly journal.

(b) Publishing an English journal.

(c) Publishing books, pamphlets and leaflets on agriculture.

(d) Conducting a library and reading room.

(e) Arranging for studies in farm and agricultural economics.

(f) Arranging lectures.

(g) Carrying on propaganda for improved agriculture through cinema shows.

(h) Arranging Field Days.

(i) Fitting up an agricultural museum.

(j) Other items of work.

(ii) *District Branches* will—

(1) carry on items of work mentioned (d) to (j) in the above list according to locality,

(2) help Taluk and Hobli committees chalk out their programmes, and

(3) discuss improvements with the local officers of the Agricultural, Horticultural and Animal Husbandry Departments and help in the execution of schemes.

(iii) *The Taluk Branches* will—

(1) carry on according to the limits of the locality all items of work suggested for the district branches.

(2) arrange for farm competitions in the taluks and awarding of prizes to the winners (taking into consideration crops, cattle, poultry, farm equipment and all other item of farming),

(3) help to start co-operative enterprises relating to agriculture, live stock and horticultural products, and

* This allotment does not pertain to life membership fees, admission fees and other funds that have to be taken to the reserve fund of the union

- (4) work in co-ordination with the Department in arranging for Subvention Plots, Subsidised Farms, and Demonstration Plots.
- (iv) *Hobli branches* will undertake all the items of work suggested for the Taluks within the Hobli limits.

Write to the Secretary—

The Mysore Agricultural and Experimental Union,
5/1, JAYA CHAMARAJENDRA ROAD,
BANGALORE-2

THE MYSORE HORTICULTURAL SOCIETY

(Registered under the Mysore Societies Act No. III of 1904)

Rules and Regulations

1. Name

The Society shall be called the Mysore Horticultural Society. (Its Registered Office is in the Lal-Bagh, Bangalore.)

2. Object of the Society

The object of the Society shall be the promotion of Horticulture in all its branches, specially in the Mysore State.

3. Year

The official year for the Society shall be from 1st January to 31st December.

4. Constitution

The Society shall consist of Patron, Honorary Members, Joint Presidents, Vice-Presidents, the Council and Members.

5. Membership

- (1) The Society shall consist of the following classes of Members:—

Fellow A—paying an annual subscription of Rs. 18.

Fellow B—paying an annual subscription of Rs. 12.

Associates—paying an annual subscription of Rs. 6.

The annual subscription shall be payable in advance excepting in-coming members who shall pay in advance for the unexpired period of the year.

- (2) Any person proposed by a member will be eligible for election. Every election shall be made by the Council at a meeting of the Council.

- (3) Every member on his election being notified to him by the Secretary shall be bound by the rules and regulations of the Society.

- (4) Members, during temporary absence from the Mysore State, will continue to have their names borne on the list as members without payment of subscription, provided they give notice and have paid all arrears due to the Society.

- (5) Members wishing to resign their membership must give notice thereof in writing to the Secretary; otherwise they shall continue to be liable for their subscription until such notice is given.

- (6) Members, allowing their subscription to fall in arrears for over a year, the same having been demanded shall be liable to have their names

struck off the list and shall not be eligible for re-election except on payment of all arrears. They will also be liable to be sued.

6. Honorary Members

(1) Any one who has rendered valuable services in furthering the objects of the Society may be elected as an Honorary Member. Any such person who is recommended by the Council and elected by the votes of two thirds of the members present and voting at the Annual General Meeting will be an Honorary Member.

(2) Honorary Members shall not be entitled to vote and they may not pay any subscription.

7. Council

(1) The affairs of the Society shall be managed by a Council consisting of a Chairman, Vice-Chairman, Honorary Secretary, Honorary Treasurer and eighteen Members, including the Vice-Chairman.

Note.—In view of the connection of the Society with the Government Botanic Gardens, the office of the Chairman shall always be held by high officers of the Mysore State. This condition can only be altered with the sanction of the Government of Mysore.

(2) The Honorary Treasurer and the Members of the Council shall be elected at the Annual General Meeting and shall hold office till the next election is held. One of the members will be elected as Vice-Chairman by the Council.

(3) The Council shall be elected from amongst A and B Fellow members. Out going members of the Council are eligible for re-election. Only Fellows A and B shall be entitled to vote for the election of office bearers and members of the Council. In cases of equality of votes, the Chairman shall cast lots.

(4) No Fellow belonging to A and B Class shall be eligible to vote for election or be elected to the Council unless the arrears due up to the end of the calendar year prior to the date of election have been paid up.

(5) In the event of a vacancy occurring after the election the Council shall fill up the vacancies by co-opting from Fellows A and B.

(6) The Council shall ordinarily meet once a month.

(7) Five members shall form a quorum for a meeting of the Council.

(8) A notice of the meeting shall be sent to the members at least seven days prior to the date fixed for the meeting, unless the Chairman considers it necessary to call a meeting at a shorter notice.

(9) The Council shall decide all matters coming before it including the election of members by a majority of the votes of the members of the Council present at a meeting of the Council. In cases of equality of votes the Chairman shall have the casting vote.

(10) Any member failing to attend three consecutive meetings without giving previous intimation to the Secretary shall be deemed to have vacated his seat but may be eligible for reinstatement by the Council.

(11) The Council may appoint either from its own body or from the members of the Society Sub Committees consisting of two or more members to deal with any special question.

(12) The Council is empowered to frame from time to time bye-laws not inconsistent with the rules of the Society.

(13) No resolution of the Council passed at a meeting shall be re-opened for discussion till after the lapse of three months.

8. Privileges of Members

Members shall have the following privileges :—

(1) A free supply of seeds and plants raised in the gardens of the Horticultural Department to the value of their subscription. Free trial of seeds and plants, etc., at the Lal-bagh Nursery. Members will be allowed to take plants and seeds to the value of their paid-up subscriptions, and they may exercise this privilege before the end of the year following that for which their subscription has been paid.

(2) The free use of the Library and the publications of the Society.

(3) Free assistance of the Society in procuring seeds and plants from abroad by previously depositing the approximate amount.

(4) Free Tickets for admission to all Horticultural Shows as below :—

Fellow A.—One non-transferable and three transferable tickets.

Fellow B.—One non-transferable and one transferable ticket.

Associates.—One non-transferable ticket.

(5) Inspection of their gardens by the Inspector maintained by the Society on a scale of charges fixed by the Council.

No member who is in arrears of subscription will be entitled to the above privileges.

9. Society's Work

The funds of the Society will be utilised for the following objects :—

(1) To hold meetings and lectures connected with horticultural and allied subjects :—

(2) To manage and promote Horticultural Shows under its auspices.

(3) To hold special shows to encourage the cultivation of such classes of plants as are out of season at the half-yearly Horticultural Shows.

(4) To adjudge and award prizes for the best kept private gardens, market gardens and orchards.

(5) To create facilities for giving technical advice to members.

(6) To encourage horticultural activities in other directions.

10. Annual General Meeting

The Annual General Meeting shall ordinarily be held in February after the Winter Show, on such date and at such hour and place, as the Council may notify. Fifteen days before the date of the meeting, the Honorary Secretary shall post at the office of the Society a notice of the meeting with a copy of the Agenda. A notice of the meeting with the Agenda shall be sent to all the members of the Society fifteen days before the date fixed for the meeting; non-receipt of the notice through loss by post or any other cause, or the absence of the member from the station shall not invalidate the proceedings of the meeting.

11. Business at the General Meeting

The business to be transacted at the Annual General Meeting shall consist of :—

(1) The adoption of the Annual Report.

(2) The passing of the balance-sheet and accounts of the previous year

(3) The election of the new Council including the Treasurer.

(4) The appointment of a Certified Auditor.

(5) Alteration of rules and bye-laws, if any,

- (6) Any other subject which the Council may place before the meeting.

12. Special General Meeting

A Special General Meeting may at any time be called at not less than fifteen days' notice on the application of at least ten members. Such application should be made in writing to the Secretary, and the object for which the meeting is to be convened should be clearly stated. The Secretary shall give seven days' notice of such meeting to the members.

13. Quorum for General or Special Meetings

The quorum for a General Annual or Special Meeting shall be fifteen members.

14. Additions and Alterations to Rules

Alterations and additions to the Rules and Regulations can only be made at a General Meeting. Any member desiring to propose any addition to, or alteration in, the Rules and Regulations or any other resolution, must give seven days' notice thereof, in writing, to the Honorary Secretary, prior to the date of the meeting.

AGRICULTURAL MONTHLY NOTES

JANUARY

MONTHLY NOTES.

PADDY

Where tanks have received a good supply of water in the rains of the North-East monsoon and on lands under well irrigation the fields will soon be sown with Vaishakhi or summer paddy. Transplant your paddy in preference to sowing broadcast. Considerable saving in seed can be effected especially if the seedlings are planted in two's or three's rather than in bunches of several seedlings. The water in the tanks, which in the coming dry weather is liable to much loss by evaporation, can be used economically by this method. Where water has to be lifted from great depths, such saving is an important consideration. Transplanting will moreover give a better yield than broadcasting. If seeds are sown in the nursery at the beginning, the seedling will be ready at the end of this month for transplanting. The fields should be manured before transplanting. For special manures for paddy, consult the Agricultural Inspector in your place.

RAGI

Nursery plots for irrigated ragi are prepared in this month and seeds sown.

JOLA

Sow bilijola on black cotton soil, in tank beds with no water in them and under tanks with limited supplies of water so as to have good fodder for cattle during the dry months.

MANGO

Mango trees flower about the middle of this month. Look for mango hoppers on the flower-spikes and spray them with a solution of Hongey oil soap made by mixing 1 lb. of the soap in 8 gallons of water; for more effective results spray a mixture of 1 lb. of DDT (550) in 16 gallons of water.

SUGARCANE

Sugarcane is planted during this month. Among the indigenous varieties the pattapatti sugarcane is a very superior local cane both in yield and quantity of sugar present in the juice. But new varieties which are more vigorous

and better yielding are now available. These are H. M. 320, H. M. 553, Babbur striped (H.M. 544 striped), H.M. 606, H. M. 607, H. M. 613 CO. 281 CO. 290 and CO. 419. Among the more recently evolved canes H. M. 661 and H. M. 647 are showing great promise. Some of these arrow from September to January. These should be planted before the end of February. Application for seed setts may be made to the Assistant Director of Agriculture of the District concerned.

Raiyats who grow sugarcane should lay in a good supply of both organic manures and artificial fertilizers as sugarcane responds well to manuring. Of organic manures, 10 cart-loads of farmyard manure or 3 to 5 tons of compost from habitation or agricultural waste may be used with advantage. A crop of cow-pea or sunnhemp grown and ploughed under would be of great benefit. As regards artificials, 1 cwt. of concentrated superphosphate and 500 to 800 lbs. of sulphate of ammonia in stipulated doses are found to be highly beneficial. Consult the Agricultural Chemist, Bangalore, or your nearest Agricultural Officer regarding the quantity and the time of application of these different manures.

GENERAL GARDEN WORK

Winter Annuals in beds and pots, will be in full growth. Apply liquid manure (1 lb. of Hongey or Castor cake in 4 gallons of water), in weekly doses.

(N.B.—Water the plants before applying liquid manure.)

LAWNS, SHRUBBERY ETC.

Prepare and root shrub and hedge cuttings. Plant those which have been rooted already. Mow lawns and roll.

Foliage plants should be watered carefully and sparingly as many of them go to rest to some degree.

FLOWER GARDEN

Get ready nursery beds for summer and monsoon flowers. Roses will be in full bloom. Remove faded flowers regularly to prolong the bloom. Hoe and mulch roses in pots and bed. Roses may be budded upon. Take cuttings of Chrysanthemum (Cascade and Korean) and root them in flats or pans or 6" pots. Cuttings will give more healthy and prolific plants than divisions. Pot Orchids.

VEGETABLE GARDEN

Sow beetroot, cabbage, carrot, celery, Knol-kohl, Lettuce, Leeks, Radish and Indian Beans. Water copiously growing plants. Earth up maize; cover cauliflower heads Blanch celery. Manure Asparagus during the last week.

FRUIT GARDEN

Strawberries will be in bloom. Liquid manures should be given to the plants once a week and watered copiously every alternate day. Manures and fertilisers should be given to fruit plants. Apples, Peaches, Plums and Grapes should be pruned. All evergreen plants and deciduous trees that have thrown out leaves should be copiously watered. Apples, Oranges, Pomegranates, Pineapples, plantains, and grapes will now be available.

Dig up pits for planting fruit plants in May, so that they may be exposed to the action of the sun during summer.

MISCELLANEOUS

Place orders for seeds and plants for the monsoon season. Spray mildewed roses and sweet peas with 1% Bordeaux mixture. Syringe stored bulbs like dahlia, achimenes, caladiums, gladioli, gloxinia etc. once a week.

BEE-KEEPING

Provide supers for strong colonies to collect extra store in the mango areas. Colonies may be built up during this and next month.

FEBRUARY

MONTHLY NOTES.

THRESHING

In making preparations for threshing, it is well to remember that this slow and tedious work can be done much more quickly and with less trouble and worry by adopting better methods than those commonly employed. Firstly, a stone threshing roller $2\frac{1}{2}'$ long by 2' high of the kind now coming into use in many parts of the State, is a very good appliance and is well within the means of the ordinary raiyat. It does the work quicker and with less labour, and can be used for threshing ragi, jola, avare, togari or hurali.

PADDY AND RAGI

If the seedlings are ready in the nursery, paddy can be transplanted early this month. Irrigated ragi may also be transplanted similarly.

POTATO

Potato crops should be sprayed with calcium arsenate solution to kill *Epilachna* beetle pest (Gulaganji-hula).

SUGARCANE

During this month also sugarcane is planted. In the case of young planted sugarcane, three weeks old earthing up and irrigation should be carried on twice at an interval of about two weeks, to control the borers. This operation should be carried out in newly planted young canes until the planting season is over. Milling is also continued during this month.

Note that with the same amount of care, a bigger money return can be obtained by the use of better mills which extract more juice and by better methods of boiling jaggery whereby a firm and light coloured jaggery, fetching a higher price, can be got.

Use red litmus paper to judge liming and a good skimming laddle to remove scum thoroughly.

GENERAL GARDEN WORK

The annuals sown in the earlier months will be in full bloom. Select varieties for seeds and mark them with descriptive labels. Dig or trench vacant beds for annuals for the monsoon. Get ready potting composts for annuals, bulbs etc. (The composition of several composts is given on Page .)

Fork or cultivate shrubberies and herbaceous borders.

Adiantum varieties (Maidenhair) should be re-potted and all the old fronds should be removed.

FLOWER GARDEN

Pot towards the end of the month achimenes, gerbera, gloxinia maculata, chrysanthemum (Korean and Japanese) suckers may be divided and potted in 3" pots.

Sow brachycome, delphinium and gerbera seeds.

VEGETABLE GARDEN

Sow beet, beans, carrot, knol-kohl, lettuce, peas, sponge gourd, turnip and greens. Irrigate crops copiously. Potatoes should be harvested.

FRUIT GARDEN

Apples, peaches, plums, orange, pomelo, pomegranates guavas, sapota, and mangoes will be in bloom. Trees should be copiously watered. Fertilisers and liquid manure should be given. Strawberries will be in fruit. Plant should be copiously watered and liquid manure be given. Fruit plants may, be grafted now and planted if there is facility for irrigation. Roseapple,

oranges, strawberries, peaches, pomegranates and grapes will be available. Pear fruit trees may be pruned.

MISCELLANEOUS

Place orders for seeds and plants for the monsoon season if not already done in the previous month. The seeds of the following annuals may be collected during the latter part of the month and in March. Alyssum, antirrhinum, aster, calendule, candytuft, cornflower, calliopsis, chrysanthemum (annual) dianthus, gaillardia, larkspur, gypsophila, petunia, phlox, portulaca, pansy, salvia, sweet pea, nasturtium, marigold, and verbenä.

BEE-KEEPING

Decoy hives (log and earthen pots) or set up old hives for attracting swarms. Honey extraction may be expected in mango areas. Hiving of colonies may be continued during this month.

This is the best month for starting bee-keeping for the first time.

MARCH

MONTHLY NOTES.

SUGARCANE

During this month also cane can be milled and planted.

COTTON

On dry land fields, the bulk of the local variety of cotton will be picked. It will pay to pick cotton clean and also to pick good cotton separately from worm-eaten, stained or otherwise dirty cotton.

GARDEN LANDS.

On garden lands, *i.e.*, under well cultivation, minor vegetable crops like beans, cucumber, maize, etc., can be now put in, which will be removed in time to prepare and get the land ready for the main rainy season crop of irrigated ragi, chillies, or potatoes.

GENERAL GARDEN WORK

Dig or trench beds for annuals that are to flower during August. Pots should be got scrubbed and cleaned.

Order summer flower seeds. Collect seeds from annuals that have seeded. Varieties may be carefully sorted, collected separately and properly labelled. Dahlia, caladium, begonias, gloxinias etc. should be taken out from pots and stored. Many shrubs that have finished flowering should be pruned.

FLOWER GARDEN

Pot violëts, hydrangeas, and achimenes, re-pot ferns, dracaenas, anthuriums, alocasias.

Take cuttings of and plant in flats or pans, carnation, coleus, fuchsia, geranium, double petunia. Sow antirrhinum, carnations, cineraria, heliotrope, nollyhock, lupinus, phlox, pink, salvia, verbenä, and torenia.

VEGETABLE GARDEN

No fresh sowings should be made now as the weather would be dry. Copious watering for vegetables should be given. Snake gourd, native beans called Chikkadi-kai and other gourd seeds should be sown now; and also minor vegetables such as Indian greens, cress and chillies,

FRUIT GARDEN

Roseapple, peaches, pomegranates, orange, strawberries, figs, and melons will be in fruit. Irrigate the trees copiously. Earth up plantain trees and apply manure.

BEE-KEEPING

An active month for the bees especially in maidan areas. Brood rearing will be very rapid and supers should be provided.

If the queens are sufficiently old it is advisable to remove them and allow young queens to develop.

The best period for discarding old combs and building up new ones is during the latter part of this month or the early part of next month.

APRIL

MONTHLY NOTES.

DRY LANDS

On dry lands when carting manure, cart also the soil from the beds of tanks which are usually dry at this time of the year, for the silt will both improve and enrich the soil.

PADDY AND RAGI

Ragi and paddy which have ripened early may now be harvested and the seed of green manures sown in the land thus released. The seeds may be sown just after the first showers or under irrigation.

COFFEE

Coffee is subject to the ravages of three important fungus diseases, namely, (i) Rust or Leaf disease which was responsible for wiping out the Ceylon coffee industry, (ii) Black rot or Koleroga common in the higher elevations and (iii) die-back. For all these diseases, spraying with Bordeaux mixture has been found to be successful. The spraying should be done before the south-west monsoon and sometimes it is necessary also to attempt a post-monsoon spraying. The time to start spraying depends on the extent of estate to be sprayed, not earlier than April and later than May. The Department issues spraying materials and sprayers on short credit, free of interest.

ARECANUT

Areca garden owners should arrange to build areca driers; it will mean better quality of nuts than in drying over an open fire and greater convenience in working. Agricultural Inspectors will render all possible aid in constructing such driers.

GENERAL GARDEN WORK

Beds which have been dug up or trenched should be repaired for sowing seeds *in situ* and planting seedlings. Manure should be thoroughly incorporated with the soil. Paths, pavements, approaches may be attended to. Old pots and pans may be thoroughly scrubbed and cleaned and kept ready for filling. Weed out lawns and grass plot.

FLOWER GARDEN

Pot rooted cuttings of Chrysanthemum to 9" pots and place them in sun after a few days. Plant out Carnation, Coleus, Fuchsia, Geranium and double petunia.

This is the chief month for sowing annuals. Sow asters, caliopis, carnations, corn flower annual, chrysanthemum, begonia semperflorens, gaillardia, helichrysum, larkspur, pansy, portulaca, petunia, salvia, sweet sultan, sweet william, stocks and verbena, double nasturtium, phlox, candytuft, clarkia, godetia and mignonette may be sown at the end of the month.

Prick antirrhinums, cineraria, heliotrope, pink phlox, salvia, hybrids, petunia, verbena. Thin out annuals sown last month and transplant heliotrope, hollyhock, lupinus, pink, salvia, verbena and torenia in the latter part of the month.

Shade crotons and other foliage plants.

VEGETABLE GARDEN

The field or bed in which vegetables have been removed should be dug up and turned over and exposed to the action of sun and air and all vegetable refuse dug in. No fresh sowing can be made now. Water the standing vegetable crops copiously.

FRUIT GARDEN

Melons, guavas and oranges will be in fruit. Water all fruit plants copiously. There is nothing more to be done excepting spraying mango trees in fruit if the expected showers of rain do not fall.

BEE-KEEPING

Honey extraction should be done in time and supers be given back. Swarms that have settled down during last month, may be transferred to improved hives towards the end of the month.

If the colony of bees in the decoy hive has had a fair start, it may be transferred into an improved hive kept in a suitable shady place.

Colonies located in tree trunks may be transferred into box hives.

MAY

MONTHLY NOTES.

DRY LANDS

On field ploughed after the previous harvest, sow in the *Bharani* rains the early mungar crops, viz., gingelly, jola, greengram, blackgram or groundnut which can be followed in the months of September or October by a second crop such as horsegram, cow-pea, bengalgram or wheat. Sow all crops in rows and wide apart, i.e., one foot, so as to make interculture easy later on,

WET LANDS

On wet lands sow a green manure crop, such as sunnhemp (30 seers to the acre) or sunnhemp and cow-pea; this will be ready for being ploughed in puddle sown paddy land in July.

GARDEN LANDS

On garden land under well irrigation, potatoes, onions and turmeric can now be planted.

KAMBLIHULAS

Wherever, in the districts of Chitaldurg and Shimoga there was an attack of 'Kamblihulas' in the previous year all the raiyats of the locality should go round their fields from now on to the middle of July to catch the conspicuous white moths. All the moths picked must be put into a mixture of kerosene oil and water and killed.

ARECANUT

The areca gardens of the mainland suffer from the effects of *Kilicragu*. The affected nuts drop down. Sometimes the affected trees are also killed. The best thing to do is to spray the bunches before the onset of the south west monsoon, with Bordeaux mixture. If the spraying is done in time and well the disease does not appear, but if not done well a second spraying may be necessary about the month of August-September. The Department issues sprayers and spraying materials on short credit free of interest. Spraying is crop insurance.

TOBACCO

Tobacco is subject to damage by the damping off fungus. As a precaution against this the nursery beds must be sprinkled with half per cent Bordeaux mixture. This treatment might also minimise infection by Leaf Spot Disease. If Leaf Spots appear the nursery should be sprayed with Bordeaux mixture. After transplantation of the seedlings, when the plants have developed a few leaves, the basal leaves should be picked off to prevent infection and if it should appear spraying with Bordeaux mixture ensures control. Be on the look out for dwarfed or crinkly transplanted plants, and pull them out immediately as they harbour a virus, a very serious trouble in tobacco. At the end of the season, the roots should all be pulled out as their remains will help to carry over the virus to the next season.

GENERAL GARDEN WORK

This is the main month for planting and sowing seedlings raised in the nursery in the previous month. Beds should be manured and turned over.

Pots may be filled up with suitable compost (see pp. 11-12). Plant out in beds and pots seedlings ready for transplanting.

FLOWER GARDEN

For the following bulbs—Tuberous rooted begonia, caladium, calla lily, A. glaucophylla, anemone, Freemantles lily, Snowdrops, blue bellflower, calceolaria, carnation, canna, calliopsis, gypsophila, helianthus, iris, peony, nigella, nasturtium, sweet pea, portulaca, verbena, balsam (H-10), Zinnia, Dahlia (seedling). Prepare stakes for sweet peas, dahlias and Gladioli at the time of planting. Pinch asters, begonia, delichysum, pansy, petunia, salvia, sweet sultan. Pinch achimenes, phlox and pinks.

VEGETABLE GARDEN

Cabbage, cauliflower, knol khol, brussels sprouts, beetroot, tomato, and celery may be sown in pots or beds. The soil dug up should be turned over and the soil mixed with manure after a shower or two of rain.

FRUIT GARDEN

Strawberries will be over 1 suckers should be taken and planted separately. guavas, oranges and other citrus plants, peaches, plums, grapes etc., may be layered. Mangoes begin to fruit this month. Begin planting fruit trees in pits dug in January and February also other trees. Fruit plants may be manured with a mixture of 3 parts of sieved sheep dung, 1 part of red earth and 1 part of sand.

MISCELLANEOUS

During the last week, wintering roses by withholding water gradually and completely stopping for 1 or 2 days and defoliating plants may be taken up. The plants may be pruned to shape.

BEE-KEEPING

Colonies hived or transferred from decoys may be built up. Colonies transferred during early March may be given supers. Honey extraction can be expected in certain districts.

JUNE

MONTHLY NOTES.

DRY LANDS

The south-west monsoon begins in this month, and it is really the season for preparing land for sowing. Nearly all the fields remain untouched. Baking and hardening through the hot months, and only the heavy showers of this month can moisten them sufficiently well to plough. Fields, however, which were given the first ploughing in the previous month should be cross-ploughed now, so as to kill the weeds which may have sprouted in the interval. In preparation of the soil for sowing, the point to remember is the great saving in time and money which can be effected by the use of the improved implements such as the improved or the mould-board plough, the six shovel cultivator, the disc harrow and the *doddakunte*. All these implements can be seen in the Government Experimental Farms. They are stocked and sold by the Agricultural Department, and can be had in the Central Implement Depot in Bangalore.

On fields got ready for sowing, main crops of jola, Mysore-American cotton, groundnut ; dry land paddy may be sown.

Kamblihulas AND GRASSHOPPERS

In all villages affected by the *Kamblihula*, raiyats should look for the moths that will emerge after heavy showers. These moths will have to be hand-picked and killed if raiyats want to avoid attack on their fields by this pest.

After the mungar rains the paddy grasshoppers emerge on the bunds. They cannot jump long distances then and are easily caught by sweeping large bags of cotton cloth over the bunds. Enormous numbers can be caught in this way. They are then crushed or thrown into water to which has been added a little kerosene. All the raiyats in the village should co-operate. The bags should be 5 feet long and 2 feet by 4 feet at the mouth. The opening is supported at the sides by two sticks 3 feet each and two men sweep the bunds at a run.

JOLA-SMUT

The jola crop suffers from smut or *kadige roga*. This disease can be successfully controlled by steeping the seeds before sowing in a solution of copper sulphate. Packets of copper sulphate each enough to treat seed for about 10 acres are available for a small cost at all agricultural depots. The packets contain directions for treatment.

GENERAL GARDEN WORK

Hoe beds, borders and shrubs. Apply liquid manure (Hongey or castor cake—1 lb. in 4 gallons of water) to all the annuals and perennials.

LAWNS AND SHRUBBERY

Bare patches in lawn may be dibbled with grass roots and rolled. Prune shrubs and renovate the shrubbery and herbaceous borders.

FLOWER GARDEN

Bed out plants sown in earlier months. Sow alyssum, balsam, candy-tuft, cosmos, marigold and nasturtium. Plant gladioli, iris, belamcanda, canna, Kaemferia, Montbretia, Hemarocallis, mignonette, dahlia, (Coetness Gem). Prick clarkia and balsam. Disbud or pinch antirrhinum, sweet pea, pansy, achimenes, ageratum, heliotrope, linaria, lupine. Stake sweet pea, petunia, heliotrope, linaria, dahlia.

Propagation:—June, July and August are very suitable months for propagation by leaf cuttings, node cuttings, soft wooded cuttings, gooteing, layering and grafting. Propagate Rex Begonia leaf cuttings, Dracaena node cuttings, crotons, roses and rare climbers and creepers, champacs, magnolia and hibiscus. Repot geraniums, begonias, fuchsias and hydrangeas.

VEGETABLE GARDEN

Seedlings that are ready and potato tubers may be planted in fields. Carrots, parsnips, beet, turnip, lettuce and Indian greens and vegetables and maize may be sown in the beginning of the month.

FRUIT GARDEN

All fruit plants may be planted. Prune grapevine and apples. Mango and jak fruits will be in season. Layer top-shoots of Raspberry.

MISCELLANEOUS

The wintered roses may be removed with a ball of earth and re-potted.

BEE-KEEPING

If the super provided in May has been half to three-fourths full with honey, a second super may now be provided. If the place is exceptionally rich in honey-yielding plants, a good crop of honey may be stored and this should be extracted. Weak colonies should be built up by uniting. Hiving work should not be taken up.

 JULY

MONTHLY NOTES.

DRY LANDS

Nearly all the main crops of the year, *viz.* ragi, jola, groundnut, *sajje*, *save*, *haraka* with their subordinate akkadi crops are sown in this month.

PADDY

On wetlands, paddy is sown in puddle if water is available, or it should be sown in a dry (not irrigated or puddled) seed-bed. It is advisable to plough in 3,000 lbs. of green manure per acre, three weeks before transplanting and about 4—5 cart-loads of Farm-yard manure two weeks before. It also pays to use artificial manures for paddy. Use a mixture of 75 lbs. ammonium sulphate and 120 lbs. superphosphate per acre just at the time of transplanting.

RAGI

H. 22 is a high yielder both in grain and straw. It is now grown on thousands of acres in the Mysore State and also in some parts of the Madras Presidency. Try its suitability to your tract. Other good strains like K-1 can also be had on application to the Department.

CHILLIES AND TOBACCO

During the first half of this month, chillies and tobacco intended to be raised as dry crops should be sown in nursery beds so as to have seedlings ready for transplanting about the end of the next month.

PEPPER

In the *malnad* this is the month for layering pepper for propagation: select the best hermaphrodite vines in the garden for the purpose.

INSECTS

Coffee stem borer.—Borer infested coffee bushes in the coffee estates should be systematically removed during this month and the next month.

Those who are troubled with ground grubs damaging sugarcane should get labourers to look for the young ones which will be found often below the soil surface. If these are picked off and destroyed, no trouble will arise later and canes will be safe.

The red headed *Kamblihula* moths begin to emerge in the ploughed fields during the middle of the month, in parts of Kolar District. The raiyats and their children should regularly pick out the moths in the early hours of the morning and evening and destroy them by putting them in a pot containing kerosened water.

Jola grasshoppers hatch out during the end of this month. They must be bagged from the bunds and destroyed.

POTATOES

Potatoes suffer commonly from a disease known locally as "*madige roga*." It is also called early blight. Spraying with calcium arsenate solution (1 lb. in 50 gallons of water) with lime caseinate as a spreader protects the plants. This is a preventive also against the *Epilachna* beetle. Spray when the crop is about a month old and a second time after an interval of 3 to 4 weeks.

APPLE ROOT ROT

To prevent the spread of this disease all dead and dying plants must be removed root and branch, and burnt to destroy the resting bodies of the fungus. The main root of the healthy plants may then be exposed 9" all round the plant and sprayed with Bordeaux mixture, after which the roots may be covered with the soil.

GENERAL GARDEN WORK

Lawns, shrubbery etc.—Stir up the bare patches and dibble root slips or turf up. Roll or beat till level. Top dress with compost or leaf mould. Dig out weeds and anthills. Trim edges with a spade. Fork round trees and shrubs. Top dress with well-decayed manure or compost. Fill in gaps. The hedges will have been trimmed by now. Fill up bare patches. Tidy up the rockery. Remove weeds and stragglers. Top dress with leaf mould. Top dress or replot with a suitable compost, fern.

FLOWER GARDEN

Fork and apply liquid manure (Hongey oil cake or cowdung water) once a week. Stake gladiolus, dahlia, and tuberous lily. Hoe and weed annual beds. Layer roses. Apply liquid manure to begonias, chrysanthemum, dahlia, geranium, gladiolus, fuchsia and roses. Stake chrysanthemum, gladiolus, heliotrope, sweet pea, petunia, fuchsia.

VEGETABLE GARDEN

Sow dwarf beans, lady's finger, cluster beans, carrot, beetroot and maize in rows directly to the plot. Sow in beds, pans or flats cabbage, cauliflower, knol-kohl, leeks and capsicum and transplant when 4-6" high. Sow gourds in pits 3 to 4 in each. Broadcast greens like lettuce, spinach, *dantu*, *chakotha*, *harive*, *sabsege* and *chilkarive* at intervals of 10 to 15 days. Transplant brinjal, chilli seedlings if not already done. Brinjal may be planted when 4" high 2' apart in the row and 3' between the rows. Weed and hoe cabbage, knol-kohl, capsicum, beans, maize and potato. Earth up and stake peas and tomatoes. Earth up potatoes.

FRUIT GARDEN

Make basins round fruit plants and fork in sheep manure, red earth and sand in the proportion of 3 : 2 : 1. Stake young plants. Dig pits and prepare for planting fruit plants during the coming rains. Sow mango stones for stock plants.

Stake mango budded shoots and pinch stock sprouts.

Remove all fallen fruits for burning or burial to control fruit flies. Layer litchi, pomegranate, raspberry; raise papaya seedlings.

Place orders for seeds and plants for winter season.

BEE-KEEPING

All sealed honey may be extracted leaving unsealed honey in the combs as a store for the Monsoon months. All supers (without any honey) may be removed and preserved. Old and unused combs in the Brood Chamber may be removed and the division board be fixed, so as to enable the bees to conserve maximum of hive temperature with the minimum of their energy. The size of the entrance may be reduced to 3 or 4 Bee space. The bottom boards have to be cleaned regularly once in 4 or 5 days. Colonies that require food for storage purposes may be fed with warm and thick syrup. No hiving work should be undertaken.

AUGUST

MONTHLY NOTES.

INTERCULTURE

A busy month for interculturing the main crops. It is well to note that for cultivating between the rows, the small *kunte* with an entire blade—a miniature *dodda kunte*—is an excellent implement, as it works the whole of the space between the rows. Labour can be economised by using two or three of these with one team.

COTTON

On black cotton soils, the main crop of local cotton (*Sauvasharti*) with its mixture of *navane* should be sown about the middle of this month. The improved strain called Selection 69 is the best to grow; it is a superior cotton and gives a higher money return.

CHILLIES AND TOBACCO

On fields kept repeatedly ploughed, harrowed and weeded during the past three months, chillies should be transplanted: so should tobacco, the transplanting of which may be continued from about the latter part of this month to the middle of the next.

GARDEN LANDS

On garden lands under well irrigation, the main rainy season grain crop of ragi may be transplanted.

LIME TREE BORER

The lime tree borer will be found in this month in small twigs, dry because they are girdled by them. These twigs have to be broken off with the aid of a forked stick if the trees are to be prevented from danger by the borer. The borers fall down to the ground from the broken ends and die.

POTATO

Potato crop should be sprayed with solution of calcium arsenate for destroying the *Epilachna* beetle.

JOLA GRASSHOPPERS

The young ones of jola grasshoppers should be bagged during this month also.

GRAPEVINE MILDEW

Grapevines are attacked by downy mildew during the North-East monsoon and very soon afterwards also by rust. As a preventive against these diseases the vines may be sprayed with Bordeaux mixture. Three sprayings may be necessary, the first to be done when the shoots are 6 to 8 inches long, the second just after blossoming and the third before the fruit changes colour.

GENERAL GARDEN WORK

The annuals, biennials and perennials will be in full bloom this month. Varieties required for the next season may be marked and labelled for collection of seeds. Get ready seeds, compost, manures, etc., required for the winter season. Potting mixtures as given on page..... may be heaped up for use in the coming months. Remove water shoots in *Bougainvillea*. Top dress lawns after mowing and rolling. Cuttings of chrysanthemum, carnation, coleus, crotons, fuchsia, geranium, and salvias may be taken and rooted in a mixture of equal parts of sand and sifted leaf mould. Sow brachycome, *Delphianum* and gerbera, double petunias.

VEGETABLE GARDEN

Sow beet, beans, brinjal, cauliflower, carrot, knol-kohl, leeks, celery, maize and greens.

Transplant seedlings of tomato, celery, leeks, brinjal.

Prepare plots for September planting. Breadfruit will be in season. Potato field should be attended to and kept free from weeds. In the absence of rain for more than a week the field should be irrigated.

FRUIT GARDEN

Peaches, plum and citrus plants may be budded now, and orange and guava etc. layered. Fruits of guava, roseapple, pomegranates should be tied upon by a fine muslin to protect them from the attacks of birds and

insects. Pineapple suckers may be planted out. Fruit plants if not planted already should be planted now as they will take root and set before the rains are over. The precautions against damage by wind should be taken by staking all plants carrying fruits, liable to suffer.

MISCELLANEOUS

Place orders for seeds for the winter season. Begin collecting seeds towards the end of the month of aster, calendula cosmos, chrysanthemum (annual), pinks, phlox, petunia, pansy, fuchsia, salvia, sweet pea, nasturtium and zinnia.

BEE-KEEPING

Most inactive season for the bees. The Bee-keepers should continue cleaning of the bottom board once in 4 or 5 days and take all necessary measures for preventing Wax-Moth infestation of colonies.

Periodical examination of colonies should be continued whenever weather permits.

SEPTEMBER

MONTHLY NOTES.

DRY LANDS

The early *mungar* crops sown in the *bharani* rains will be ready of harvest towards the latter part of the month; after harvest, plough these lands and prepare them for a second crop of horse-gram, cow-pea or *avare* as suggested under May. In black cotton soils or dry tank beds and bunded fields wheat or Bengalgram may be sown.

FODDER AND CATTLE

It should be noted that from this month onwards till the close of the year green fodder is in full flush. The manure, principally the urine from the animals, is very valuable during this period, much more so than during the hot months or early rains when all animals, excepting those in milk or working bullocks are practically on starvation rations. Special care should be taken to see that all the urine from the stalls finds its way into the manure pit.

WET LANDS

Towards the end of this month, on well-drained wet lands and garden lands Cambodia cotton may be sown; but this does not yield as much crop as that sown in May or June.

PADDY PESTS

Paddy is liable to be attacked by stem borer from this month up to November. The plants attacked will have the shoots withered. The caterpillars turn into moths. The moths lay eggs in masses, covered by golden hairs on the leaves. These are easily seen and should be handpicked and destroyed. Light traps (hurricane lanterns placed hanging over a basin with a little water and kerosene) kept in the field at a height of 4 ft. from the ground will attract and kill the moths.

COFFEE STEM BORER

Borer infested coffee plants in the estates should be completely burnt by the middle of this month. This will reduce the borer incidence during the next two months.

MILDEW ON PEAS

The pea crop suffers very badly from mildew, which covers the leaves like an ashy bloom. To prevent this spray early with 1 per cent Bordeaux mixture and oil as adhesive or dust with flowers of sulphur.

GENERAL GARDEN WORK

Dig and prepare beds for annuals that flower in February. Pots may be got cleaned and stored. Repot ferns, anthuriums, alocasias, begonias (Rex) crotons, dieffenbachia and maranta etc. Cuttings of plants mentioned in the previous month may also be taken this month and rooted. Sow antirrhinums, carnation, cineraria, delphinium, hollyhock, lupin us, pinks, salvias (Hybrids), pansy, torenia, continue seed collection of annuals etc.

VEGETABLE GARDEN

Sow carrots, cabbage, cauliflower, celery, knol-kohl, leeks, lettuce, gourds, beans, cluster beans, brinjal, ladys finger. Transplant seedlings raised in the previous month. Keep plots free from weeds.

FRUIT GARDEN

Loquots, guavas, pomegranates, komarac, apple, oranges will be in fruit. Fruit plants may be planted this month also. Peach stones and other fruit seeds should be collected for raising seedlings. The lowermost leaves of cocoanuts should be pruned now and also attention should be paid to plantain trees.

BEE-KEEPING

Regular cleaning and examination of colonies should be continued. In the later part of the month, colonies should be given stimulative feeding to prepare them for the coming dry crop season (Niger, Gingely etc.) It is advisable to unite very weak colonies.

OCTOBER

MONTHLY NOTES.

CROPS

The month for the sowing of the *hingar* crops, such as *hingar jola*, the various grams, coriander, wheat, cheap grains like *baragu* or *save*, etc., on dry lands in Chitaldrug, Shimoga, and generally the northern part of the State.

WET AND GARDEN LANDS

On wet and garden lands, potatoes, Cambodia cotton and the various garden crops can be sown.

SUGARCANE

In some parts of the State, this is also one of the seasons for the planting of sugarcane; this is done under tanks which are known to get very good supplies almost unfailingly during the heavy *hasta*, and *chitta* rains of this month, which will carry the crop through the hot months, when the cane will be in full growth and would require heavy irrigation. This planting has the advantage of enabling the raiyat to mill cane long before the general milling season begins, and to put jaggery on the market when prices rule high—(vide notes under January, *re* seed setts for planting).

AVARE (DOLICHOS LABLAB) POD BORER

Look for *avare* pod borer of which a few caterpillars will be found on the fresh few flower spikes that will appear this month. If they are gathered and killed, the subsequent generations will be prevented. Whitish round eggs are found in large numbers on young pods and flowers. These will have to be rubbed off. Children can be trained to do this work.

COFFEE STEM-BORER

The stems of coffee plants in estates where the coffee-stem borer is bad should be swabbed with any one of the ovicidal washes during this month. Attention to scrubbing of the stems of coffee should also be paid to reduce the borer trouble.

GENERAL GARDEN WORK

All vacant ground should be made ready for planting. Preparation should be made for any alterations in the design of the rock garden or the flower garden, the plants being removed to the reserved garden. Gravel paths and walks should be rolled and repaired where necessary. Weed lawns. Turf should be laid this month.

THE FLOWER GARDEN

Seeds to sow:—Sow the seeds of annuals and perennial flowers like seeds of carnation, salvia, statice, heliotrope, for the cold season in seed pans or protected seed beds.

Dahlia tubers and gladioli corms should be lifted and stored.

About the middle of the month sow flower seeds that are to be broadcast direct in the beds.

Potting:—Top-dress ferns, repot maidenhair fern, dracaena, rex begonia, anthuriums, alocasias, marantas, double geranium, single geranium, carnation, shrub begonia, fuchsia, violet, hydrangea.

Propagation:—All kinds of herbaceous plants may be divided. Air layering of Codeums and Lileaceous plants may be taken up.

Cuttings:—Cuttings of coleus, Anthuriums, Alocasias Phlox, Roses, Salvias, various shrubs, verbenas etc. can now be struck.

Plant out:—Biennial and Perennial seedlings.

THE VEGETABLE GARDEN

General Operation:—The hoe must be kept busy between growing crops. The ground should be cleaned after beans and peas and dug or trenched so that it may lie fallow during winter. Beetroot and Carrots should be lifted when the tops fade. Onions and turnips seed beds should be thinned.

Earth up—celery and leeks.

Seeds to sow:—Sow seeds of brinjal plant and tomatoes for a spring crop. Sow vegetable seeds that are to be broadcast direct in the beds such as greens, spinach, radish, beans etc.

Plant out—cabbages, endive, lettuce, cauliflower, knol-kohl.

Thin tomatoes if abundant, cut off portion of the leaves that shade them. Stop the leader and remove the side shoots. Manure-water will help the plants if the crop is a heavy one.

THE FRUIT GARDEN

General Operations.—Preparations should be made for planting and towards the end of the month, planting itself may be commenced. Pinch stock—sprouts from the young plants. Remove rank vegetation in the garden.

Figs :—The old fruit leaves and the naked oldwood should be cut away to give ample room for the new shoots.

Raspberries :—Cones which have fruited must be cut out, three or four young ones being left to the stool. New plantations may now be made.

Strawberries :—All runners should be removed from the plants.

Pests and Diseases :—Spray bordeaux mixture against Mildew and Black spot. Spray Hongey oil soap solution against mealy bugs, scale insects and thrips. Beetles and caterpillars on horticultural crops may be hand-picked or sprayed against with a solution of Calcium arsenate (1 lb.), Lime (2 lb.) and Jaggery (3 lb.) in 50 gallons of water.

Preservation :—Prepare tomato juice, orange and Lime squash : pickle lime and onions. Prepare marmalades from Orange and bitter orange and Jam and Jelly from Guava, Apple and Grapes. Slice and dry out potatoes.

BEE-KEEPING

Bee-keepers of Maidan areas have to take special care of their colonies to prevent swarming tendencies during this month when the dry crops like Niger, mustard, horsegram etc., are in full bloom. Supers with preserved combs or foundation sheets should be given back to the colonies. If the Queen is old, she should be removed to allow a young queen to develop soon after swarming symptoms are noticed or when the drone brood is present.

Decoys should be set up for capturing swarms. Bee-keepers of *Malnad* areas have to examine the colonies whenever the weather permits them to remove all symptoms of Wax-Moth infestions. They have to feed the colonies with warm syrup occasionally to maintain the strength of the colonies.

NOVEMBER

MONTHLY NOTES.

A few days before harvesting ragi, go over the field and select and harvest separately all ear-heads which are large in size and have good number of spikes. Dry and thresh them separately and preserve carefully for seed. This seed will give you plants with large ear-heads with many spikes and hence, a much bigger yield than unselected seed.

SUGARCANE.

On wet land reserved and being prepared for sugarcane, green manure crops can be sown. Applications for seed setts should be made early.

COTTON.

Mysore-American cotton (*Doddahatti*) sown in May-June will be ready for a first picking ; and in picking, care should be exercised, as mentioned in the notes under March. The best plants, *i.e.*, those bearing profusely should be marked down too and their cotton should be picked and stored separately. This should later be ginned at home and the seed preserved for sowing next season.

FODDER.

Jola raised for fodder and green grass in the jungles will be in condition for making ensilage, and every cattle owner should arrange for this method of storage.

AVARE POD BORER.

Rubbing off eggs and caterpillars of the avare pod borer had to be done this month also. See notes for previous month.

COFFEE.

As soon as the rains cease, spraying against green bug on coffee should be commenced on all infected estates and continued until the picking season. They will be observed only on a few trees to begin with, and if these are sprayed the severity of infestation will be considerably reduced. The infestation will start with an ant's nest in the ground or on the tree as a centre. Spraying should be continued after the rains until the monsoon sets in.

GENERAL GARDEN WORK

Keeping the garden tidy is the principal work during the month. All rubbish should be collected, burnt or dug in. Have an eye and hand on weeds.

ORNAMENTAL GARDENING

The Lawn.—Lawn mowing is to be kept up as long as new growth continues. This keeps the turf looking well, and improves its—condition next year. Weed out the lawns and remove anthills, by applying Kerosene emulsion or Gammexane.

Roads and Footpaths.—Repair the surface of paths and roads that have been scoured during the monsoon.

Shrubbery.—May be forked over and gaps filled up.

Hedges.—may be trimmed and gaps may be filled up.

Rockery.—Rock plants require attention. They should be trimmed and cut back where necessary. Weeds have to be removed.

Stake Orchids that are in flower.

Cannas may be dug up and planted out in pots or beds.

As the Crotons suffer from heavy dew late in the month and in December, it is better to give a top dressing of horse dung to the plants and keep them in a shady place protected from winds. If dew collects, syringe the foliage.

Prick the seedlings of larkspur, antivitinin, clianthus pansy, phlox, petunia, salvia and verbenas.

Top dress coleus, cockscomb, maidenhair ferns and palms and other foliage plants.

Sow seeds of nasturtium, petunia single, sweet peas, porulaca and poppy, brachy chome calendula, candytuft, gypsophila during the middle of the month.

Liquid manure should be applied to geraniums and—other perennials and annuals in pots.

Foliage and flowering plants suffer from dew in the morning. It would be better to syringe the crotons, foliage and other flowering plants with water at about 7 a.m., to wash away the dew collected on the leaves.

Plant perennials such as angelonia, pentascarnea, salvia, impatiens, michaelmas daisy, gerbera, calliopsis, verbenas and canna in the herbaceous borders.

Plant seedlings of annuals such as antirrhinum, petunia, aster, salvia heliotrope, pink, zinnia, zinnia linaria, marigold, candytuft, pansy, verbenas, celosia and nasturtium in beds.

Propagation.—Roses may be budded upon or layered. Put down cuttings of such plants that are at their best in the cool season.

VEGETABLE GARDEN.

General Operations.—Frequent hoeing between growing crop is important. Keep the vegetable plots free from weeds.

Tomato :—Leaves shading the fruits from the sun should be picked off carefully and the fruit should be thinned if necessary.

Cover Cauliflower heads with their own leaves to prevent discolouration.

Weed plots of beans, brinjal, tomato, beetroot, and carrot. Stake peas when they are about 4 to 6".

Seeds to sow.—Continue successive sowings of beans, carrot, peas, kohlrabi, turnip, radish, lettuce and greens.

Planting.—Transplant tomato, brinjal, cabbage, knolkohl, and capsicum. Plant out onion bulbs. Earth up beans, maize and potatoes.

FRUIT GARDEN.

General Operations:—The surface of the ground around the fruit trees should be hoed. Remove rank vegetation. Planting should be carried out. Prune the dead and dried branches. Prune grapevines as soon as the leaves fall. Figs will be in fruit now. The plants should be copiously watered during the bearing season and fruits protected by tying muslin around the fruit. Pomegranates and peaches will also be available. Lay open the roots of mango and withhold water entirely in order to accelerate the left growth and ripening of the wood.

PESTS AND DISEASES

Smooth-barked trees and shrubs are subject to the attack of scale and should be sprayed with one of the mineral soluble oil emusions. Spray Honzey oil soap (1 lb in 8 gallons) sufficiently strong to kill scales on shrubs and trees. Tobacco decoction, may be sprayed on cabbage, knol-kohl, brinjal and peas infested with plant lice and shrubs infested with mealy bugs, green bugs and plant lice.

PRESERVATION.

Prepare juice from lime, orange and grapes; marmalade from orange and bitter orange; jam and jelly from apple and grapes; slice and dry potatoes pickle lime and bitter lime.

BEE-KEEPING.

Colonies in Maidan areas give a good harvest of honey from dry crops. In other areas the colonies should be taken care of by occasional feeding and regular cleaning of bottom boards.

Good care of the bee colony should be taken; wax-moth should not be allowed to breed in the hive; the entrance into the hive should be reduced much in the case of a weak colony to prevent the wax-moth trouble as there is some possibility of the colony dwindling in numbers during this month and the next. Sugar syrup or dilute honey or combs with capped honey should be supplied if found necessary; every effort is to be made to keep the colony fairly strong.

DECEMBER

MONTHLY NOTES.

DRY LANDS.

Soon after the dry crop of ragi or jola is harvested, the field should be ploughed up immediately. In this way, the moisture in the lower layers of the soil will be protected from the drying action of the sun and wind. The soil will be in a fit condition to receive and soak up the early rains of April and May, and thereby to enable us to start *mungar* ploughing early, or sow an early *mungar* crop like those specified in the notes under May. The soil will weather well, which as many raiyats know, is equivalent to applying manure; the roots of weeds will be killed, and the pupae of insects destroyed.

This ploughing is a very important operation for dry lands, for in a year of poor rainfall, it will help to tide the crop over the drought. It should therefore be attempted notwithstanding difficulties, such as the presence of the *akkadi* or subordinate crop, the hardness of the soil, etc. Immediately after harvest, the soil will be moist enough to plough or disc, and, at that time, it will be also possible to dodge the rows of the mixed crop in ploughing.

SEED STORAGE.

From this month onwards, grains, pulses, etc., will be put in store. See that all are thoroughly sun-dried before storage. Store preferably in tins with narrow mouths. When the grains and pulses are well settled down treat as follows: In the case of pulses, put on top a layer of sand 1 inch thick; weevils emerging from the pulses will come through the sand but will fail to return and so fail to reproduce. In the case of paddy, use a mixture of chunam powder and sand, half and half. In both cases, there should be an opening at the side down below for withdrawal from time to time. When the grains and pulses are so withdrawn, the top layer of sand or sand and chunam is likely to be disturbed. See that it is set right each time.

POTATO.

Materials for spraying potato against its pests and diseases must have been bought by now and the crop should be sprayed in time. (*Vide* Notes under July.)

GENERAL GARDEN WORK

Hoe beds, borders etc. Apply liquid manure to pots, beds and borders to ensure good bloom. Plant seedlings sown earlier.

FLOWER GARDEN

Sow alyssum, balsam, cosmos, marigold and candytuft, nasturtium, Prick Clarkia and balsam. Disbud or pinch plants mentioned under June Notes. Stake sweet peas, petunia, heliotrope, linaria. Pot geraniums, carnation, shrub begonia, fuchsia, and hydrangeas. Propagate Rex begonia.

VEGETABLE GARDEN

Sow beet, cabbage, cauliflower, carrot, turnip, knol-kohl, capsicum, brinjal, and water melon. Transplant seedlings that are ready. Earth up celery and begin blanching,

FRUIT GARDEN

Apples, figs, oranges and grapes will flood the market about Christmas the best of fruits will be available now. Water all fruit bearing plants copiously and allow deciduous trees to rest. By the end of the month it is well to lay open the roots of peaches, plums and grapevines and apples and

withhold water entirely in order to accelerate the fall of the leaf and the ripening of the bearing wood. Cape gooseberries will be in fruit. Some fruit trees should be dug around the stem to the extent to which the roots have spread and the roots exposed and manure given after a fortnight.

MISCELLANEOUS

Roses may be repotted (See Notes for June).

BEE-KEEPING

The colonies should be given stimulative feeding and should be prepared for the season. If the colonies are very weak it is advisable to unite them.

The Bee-keepers of *Malnad* should clean the hives regularly and feed them occasionally.

It is advisable to have some pollen yielding annuals nears the Apiaries.

Seasonal Operations on a Sheep Farm

JANUARY :	Weaning of lambs. General shearing of sheep, i.e., local, foreign and cross-breeds.
FEBRUARY :	Dipping for external parasites like ticks and lice if required and in areas where it is a seasonal occurrence.
MARCH :	Classing and culling of sheep for replenishing of old and sale of surplus stock. Special feeding of breeding ewes and stud rams.
APRIL & MAY :	Mating, cruching of woolly and cross-bred sheep to prevent them from blow fly strike.
JUNE & JULY :	Shearing of local sheep (2nd clip).
AUGUST :	Dipping of shorn sheep if necessary. Special feeding of valuable ewes and particularly those in advanced pregnancy. Hoof-paring in heavy rainfall areas.
SEPTEMBER TO NOVEMBER :	} Lambing period. Careful management of lambing ewes and suckling lambs.
NOVEMBER- DECEMBER :	
NOVEMBER- DECEMBER :	Tattooing, docking of lambs in tailed breeds and castration.
DECEMBER :	Dehorning of ram lambs selected as future rams.
DECEMBER :	Clipping of local sheep after washing in running water.

SOME IMPORTANT INSECT PESTS OF CROPS INCLUDING FRUIT TREES AND VEGETABLES AND THEIR CONTROL.

The most important of the insect pests of crops and their control measures are mentioned in the monthly notes in the calendar. The following are some other important insects, not mentioned in the monthly notes but are often noticed to damage crops including fruits and vegetables and the remedial measures that should be adopted.

1. *Caterpillars and beetles feeding on the foliage of fruit and vegetable plants.*—

Spray thoroughly on both sides of the foliage with a solution of calcium arsenate, lime and jaggery.

Calcium arsenate	...	...	1 lb.
Lime	...	...	2 lbs.
Jaggery	...	...	3 lbs.
Water	...	...	50 gallons.

Make a paste of the chemical with a little water; dissolve the lime and jaggery in sufficient water and filter; mix the paste with the filtrate with the addition of more water; finally pour in the rest of the water and stir very vigorously.

Spraying with this mixture should not be done if fruits have begun to ripen on the trees.

2. *Cocoanut beetle.*—It is commonly known as Rhinoceros beetle. Pierce and extract the adult red-brown beetle, hiding in holes around the bases of leaf sheaths, by means of a stiff hooked wire, during the daytime and destroy them.

Pick out the white and partly curved young ones, in manure heaps and pits and destroy them

Clear the garden of all old and rotting parts of cocoanut plants systematically.

Expose fermented castor-cake in a semi-liquid form in shallow pans in the garden.

3. *Cardamom caterpillar.*—Collect and destroy the pupal cocoons found in the loose earth and excreta mixed up together at the bases of shade trees between January and May. Collect caterpillars showing white fungus on them and distribute them all over the estate.

4. *Tobacco stem-borers.*—Spray the young seedlings in the nursery with solution of calcium arsenate once a week.

Remove flush with the stems such of the leaves that show signs of wilting and destroy them completely. This is to be done a few days after transplantation in the field. Later, look for swellings on the stems; if they are present, slit them vertically by means of a sharp knife and give a side twist of the tip of the knife inside. Care should be taken not to pierce the knife through the swellings.

5. *Plant-lice, scale-insects and mealy bugs on tender leaves and twigs of fruit, vegetable and flower plants.*—

Spray thoroughly with a solution of honkey oil resin soap. Dissolve 1 lb. of honkey oil soap in 10 gallons of water, for use against plant lice; in 5 gallons of water against scale insects; in 3 gallons of water against mealy bugs.

Spraying is to be repeated at intervals of 15 days to obtain maximum control.

6. *Onion thrips.*—Spray the plants thoroughly with a solution of honkey oil resin soap, mixing 1 lb. of the soap in 8 gallons of water. This solution should be mixed with tobacco decoction made by soaking 1 lb. of tobacco waste in 1 gallon of water overnight. The leaf whorls have to be opened up as far as possible during the operation of spraying.

Repeat the operation two weeks later,

7. *Termites or white ants* damaging seedlings of fruit and flower plants.—

Where the clearing is new the seedlings are to be transplanted in sand beds ($\frac{1}{2}$ foot in diameter) in the soil; the manure and water are to be applied around the sand.

Termite nests, if present in the vicinity, must be completely dug out and destroyed.

8. *Termites attacking cane setts*.—Dip the setts in a solution made by dissolving one part of lead arsenate and ten parts of slaked lime in enough water; the solution must be of whitewashing strength. Dipping must be done at the time of planting.

9. *Red ants* damaging leaf and flower buds of young fruit and vegetable plants.—

The nests found in the plant beds and outside must be treated with calcium cyanide powder or flakes or 5% D.D.T. or Gammexane—Do 25. Care should be taken to avoid contact of the cyanide with the plant and the roots.

Where the ant nests are in close contact with the roots, watering with tobacco solution having soap dissolved in it, must be done repeatedly, at convenient intervals.

The buds may also be dusted liberally with fine tobacco sand mixed with fine wood ashes

10. *Minute red spiders* and *mites* on fruits and leaves of flower plants.—Apply evenly a fine dust of powdered sulphur, 1 part and, dry wood-ash, 4 parts.

11. *Rice case worm*.—Place a rag soaked in kerosene at the water inlet to the plot until a film of oil forms on the water surface and disturb the plants by moving a long bamboo pole or rope across the paddy plants repeat this operation several times.

12. *Sugarcane borers*.—(1) Dead heart borers—Give a light earthing up by means of a light mould-board plough along both sides of the rows of cane; irrigate soon after.

(2) Top shoot borers—Hand pick the adult white moths and the buff-coloured hairy egg masses usually seen on the leaf blades; release back in the field the natural parasites coming out of the egg masses.

13 *Borers in cane setts* used for planting:—

Soak the setts in standing water for 48 to 72 hours before planting.

14. *Flies attacking fruits*.—Rake up or plough well the soil in the orchard around the plants frequently before the ripening of fruits.

Collect systematically rotting and fallen fruits and bury them deep underground.

FUNGOID DISEASES OF CROPS AND THEIR REMEDIES

ARECANUT

1. *Koleroga* caused by *Phytophthora arecae*:—*Symptoms*:—Dropping down of immature nuts during the rains of the south-west monsoon. A rotting of the growing bud occurs in heavy rainfall areas of Shimoga and Chikmagalur Districts.

Remedial measures:—Removal of dead tops; collection of fallen nuts and other infected parts and burning them, spraying of the fruit bunches with

Bordeaux mixture about the end of May or first week in June and repeating the spray during the break in the monsoon, viz., August or September.

2. *Anabe-roga* caused by *Ganoderma lucidum*.—*Symptoms*.—Death of roots and basal portion of trunk, resulting in a brown rot whereby the tissues become dry and brittle, yellowing and narrowing of the crown, a gummy exudation from the base of trunk and formation of bracket like fruit-bodies of the fungus in later stages, occurs in the plateau or *maidan* regions like Tumkur, Hassan and Chitaldrug Districts, affects also the coconut palm.

Remedies.—Destruction of infected material and fruit-bodies of the fungus, isolation of infected trees in the early stages; application of sulphur dust to the soil at the rate of $\frac{1}{2}$ —1 lb. per areca palm and 2—3 lbs. per coconut palm.

COFFEE

3. *Black-rot koleroga* caused by *Corticium koleroga*.—*Symptoms*.—A rotting of the leaves and berries with a web-like cottony growth on the under surface of the leaves; does more havoc in higher elevations than in lower.

Remedies.—Spraying with Bordeaux mixture once before the south-west monsoon, viz., in April or May and a second time in September.

2. *Leaf disease of rust* caused by *Homileia vastatrix*.—*Symptoms*.—Appearance of orange yellow spots on the under side of the leaves and a corresponding dry area on the upper surface; occurs in lower elevations more than in higher; four physiological races of the fungus are known.

Remedies.—Spraying as against *Black-rot*.

3. *Die-back* due to *Colletotrichum coffeanum*.—*Symptoms*.—Death of twigs from the ends backwards.

Remedies.—Spraying as against *Black-rot*.

JOLA

Smut or Kadige roga.—*Symptoms*.—Grains of affected eartheads replaced by tiny sacs of sooty powder.

Remedies.—Steeping the seeds in a 1 per cent solution of copper sulphate (1 lb. in 10 gallons) for 15 minutes and subsequent drying; an after-treatment of the seed by steeping it for 5 minutes in a 1 per cent solution of quicklime reduces germination injury.

POTATO

Early-blight caused by *Alternaria solani*.—*Symptoms*.—Spotting of leaves and leaf-curl; drying of leaves in late stages; reduction in size of tubers.

Remedies.—Spraying with 1 per cent Bordeaux mixture or a solution of calcium arsenate (1 lb. in 50 gallons) when the crop is 2—3 weeks old and a second spraying after a month.

2. *Ring disease* caused by *Bacillus solanacearum*.—*Symptoms*.—Sudden wilting of the plants; presence of a brown ring in the cut tubers, a little distance from the margin.

Remedies.—Careful seed selections, rotation of crops and finishing off all agricultural and other routine operations in healthy plots before taking them up in infected areas.

APPLES

1. *Root-rot* caused by *Sclerotium rolfsii*.—*Symptoms*.—Death of roots with a growth of a web-like fungus on them, accompanied by the production of small round structures looking like ragi grains.

Remedies :—Removal of affected trees and exposing the main roots of living trees and spraying them with 1 per cent Bordeaux mixture.

2. *Stem-rot associated with Schizophyllum*.—**Symptoms** :—Dry-rotting of the wood of the trees ; black ooze on affected stem.

Remedies :—Protection of pruning cuts and other wounds with white lead paint or red lead paste. Sun-cracks which may provide points of infection may be avoided by painting the main stem and branches with thick whitewash.

3. *Powdery mildew*.—**Symptoms** :—Appearance of spots ; white and whitish mealy growth on them.

Remedies :—Spraying with 1 per cent Bordeaux mixture after the fruits have set and repetition after a month.

GRAPEVINE

1. *Downy mildew caused by Plasmopara viticola*.—**Symptoms** :—Pale yellow transparent oily spots on the upper surface of the leaves with a downy growth on the corresponding under surface ; spots increase in size, turning brown, and the leaves die and drop down. Green shoots, tendrils and fruits also may be affected.

Remedies :—Spraying with 1 per cent Bordeaux mixture at least three times during season, the first when the shoots are 6—8 inches long, the second after blossoming and the third before the fruits change colour.

2. *Powdery mildew*.—**Symptoms** :—Leaves and bunches of fruits covered with patches of a greyish-white growth with discolouration underneath ; affected leaves and fruits drop down.

Remedies :—Spraying as above.

3. *Rust*.—**Symptoms** :—Leaves covered with small yellowish orange dots, containing the spores of the fungns.

Remedies :—Spraying as above.

MOSAIC DISEASE

Symptoms :—Appearance of yellow patches on leaves interspersed in the green tissues ; appear commonly on sugarcane, tobacco, tomato, potato, etc.

Remedies :—Pulling out affected plants together with roots and burning them ; careful seed selection.

POWDERY MILDEW

Besides affecting crops above mentioned, affects also the betelvine, peas, mango, roses and a number of others, producing similar symptoms. They can be controlled by Bordeaux spraying or dusting with sulphur.

FUNGICIDES

Fungicides are of two kinds—liquid fungicides and powder or dust fungicides.

The best all-round liquid fungicide is Bordeaux mixture, which derives its name from the town where it was discovered. It consists of a mixture of solutions of copper sulphate and quicklime. To this mixture is usually added an adhesive or spreader, which serves not only to secure a complete covering of the plant surface, but also to enable the liquid to come in proper contact with the fungus.

Bordeaux mixture was first used in Mysore in 1908 against Koleroga of arecanuts and from there it spread gradually to the neighbouring Provinces of Madras and Bombay and the States of Cochin and Travancore. The

mixture commonly used against *area*. Koleroga is the 1 per cent Bordeaux mixture because it contains 1 lbs. by weight of copper sulphate in 100 lbs. weight of water :—

It consists of :—

Copper sulphate	...	...	...	5 lbs.
Quicklime	...	...	...	5 "
Water	...	...	...	15 gallons.

Out of this volume of water one gallon is reserved for preparing the adhesive. Five pounds of copper sulphate is dissolved in 12 gallons or 4 paces seers of water in a wooden or copper or brass or earthen vessel (iron or zinc vessels should not be used, by tying it up in a bag of cotton or jute cloth and suspending it from a stick placed across the top of the vessel so that the bag just touches the water.

Five pounds of well burnt stone lime is slaked with a little water, and then made up to 12 gallons or 48 paces seers.

The copper sulphate solution is slowly poured into the lime solution accompanied by stirring. A mixture of a beautiful sky blue colour results. Lime is apt to contain stones and it sometimes happens that the mixture contains an excess of copper sulphate due to imperfect neutralisation. Excess of copper sulphate, if present, may be detected by dipping the end of a polished knife blade into the mixture for a minute, when the blade will show a coppery brown deposit. In such a case more lime solution should be added till a polished blade remains bright when dipped into the mixture.

ADHESIVES OR SPREADERS

The adhesive used in the earlier years was resin-soda. Resin-soda prepared by boiling 2 lbs. of resin and $\frac{1}{2}$ lb. of soda ash in one gallon of water till the mixture is quite clear. This will take about one hour. This is added to 24 gallons of Bordeaux mixture as prepared above, accompanied by stirring.

Since resin-soda entails some trouble in its preparation, another adhesive called lime-caseinate was introduced. Half a pound of fine ground casein is soaked in $\frac{1}{2}$ gallon of water and to this is added $\frac{1}{2}$ lb. lime slaked in $\frac{1}{2}$ gallon of water attended by stirring. The casein dissolves in about quarter of an hour.

In place of resin soda or lime-caseinate, cheap vegetable oils may also be used as adhesives. These are in addition supposed to increase the fungicidal efficiency of the Bordeaux mixture. Oils like groundnut oil, or coconut oil are added to the copper sulphate solution used at the rate of half paces seer for 15 gallons of the mixture. On mixing with the lime solution, a sort of emulsification of the oil results. Bordeaux mixture is ordinarily used at a strength of 1 per cent and sometimes even at one half of 1 per cent.

Bordeaux mixture has now come into general use as a very efficient fungicide. It is used to control Koleroga or arecanut, Koleroga or coffee leaf-disease and die-back of coffee, powdery mildew and downy mildew of grape-vine, mildews on beet, etc., apple scab, peach, orange, tobacco, etc., and early blight caused by *Alternaria* on potatoes, root rot of apples, etc.

SULPHUR

In the control of the mildews, sulphur in the form of sublimed sulphur or "flowers of sulphur" or fine-ground sulphur, has come to be used largely. Sulphur dusting is also useful against mites on citrus fruits.

Sulphur has proved to be a good fungicide for use against *Anaberoa*, *Ganoderma lucidum* of areca and coconut palms. The soil around the palms is dug up and the sulphur dust applied at the rate of $\frac{1}{2}$ lb. for an areca palm and 2 to 3 lbs. for a coconut palm, and the soil thrown back.

CALCIUM ARSENATE

Against early blight of potatoes calcium arsenate dissolved in water at the rate of 1 lb. in 50 gallons has been found to give beneficial results. Lime-caseinate is used as an adhesive. Calcium arsenate has insecticidal properties. It is used chiefly against the potato *Epilachna*. It can be combined with Bordeaux mixture for greater effectiveness.

In cases where an insect attack and a fungus attack coincide, it may be possible to use a combined spray which will save time, cost and labour involved in the individual applications.

WOUNDS AND INJURIES ON FRUIT TREES

Pruning cuts and sun-cracks lead to serious injuries in fruit plants. For this reason it is necessary to protect all such injuries. Sun-cracks might be prevented by applying a coat of thick whitewash to the main stem. Pruning cuts should be protected by applying a paste of white lead and linseed oil.

ZINC SULPHATE

Spraying with zinc sulphate has given good results against chlorosis or mottle-leaf of citrus plants.

Zinc sulphate	...	1 lb.
Lime	...	2/5 lb.
Water	...	10 gallons.

The zinc sulphate is dissolved in three gallons of water. The lime is slaked with a little water at first and then made up to seven gallons. The zinc sulphate solution is poured into the lime solution, the mixture being stirred. The spray is best applied on the new flush of leaves.

LIME-SULPHUR

Lime-sulphur preparations are very useful against mildews and rusts and such external parasites as also against scale insects and mites. It has proved to be good also against citrus canker, a bacterial disease. It is however a little difficult to prepare.

Stone lime	...	5 lbs.
Flowers of sulphur	...	10 "
Water	...	5 gallons.

In its preparation and use, iron vessels and sprayers should be employed and not those made of copper. Place one gallon of water in the iron cooker and bring to boil. Add the lime and when it is slaking well add the sifted sulphur. Add enough water to make a thin paste and mix thoroughly. When the slaking is over add more water to make up to $5\frac{1}{2}$ or 6 gallons. Boil vigorously for about an hour stirring constantly. An amber-coloured liquid results. When cool, strain the mixture and store it in bottles or air-tight vessels. If the solution does not fill the bottle or when any of the solution is drawn for use, a layer of kerosene may be poured on the surface to exclude air. This is the stock solution. For actual spraying, it is necessary to dilute it 1 in 18 or 1 in 25.

Lime-sulphur contains a number of different compounds of sulphur and calcium, but owes its fungicidal value to the amount of calcium polysul-

phides present. The specific gravity test as applied hitherto to lime-sulphur does not give a definite indication of the polysulphide content, but if the procedure of diluting the stock solution so as to produce a given specific gravity after dilution is followed, a fairly efficient spray results. This final specific gravity varies from 1'005 to 1'05. When carefully prepared, the lime sulphur diluted 1 in 18 will give a specific gravity of 1'01, and diluted about 1 in 37, will give a specific gravity of 1,005.

The adhesive qualities of lime-sulphur may be increased by the addition of lime-caseinate.

SEED DISINFECTION

Many fungoid diseases are transmitted through the medium of the seed, and hence it is necessary to disinfect the seed. An instance of a disease that is carried through the seed is the smut on jola. To prevent this appearing on the crop, the seed is steeped in copper sulphur solution. It is prepared in a wooden or copper vessel as follows:—

Copper sulphate	...	...	1 lb.
Water	...	...	10 gallons.

The seed is immersed for 15 minutes and then dried and sown as soon as possible. If sowing is delayed, some lowering of germination capacity may result. An after-treatment of the seed by steeping it for five minutes in a solution of quicklime (1 per cent) will reduce germination injury.

A BRIEF NOTE ON SOME OF THE IMPROVED VARIETIES OF FARM CROPS

(Contributed by the Botanical Section.)

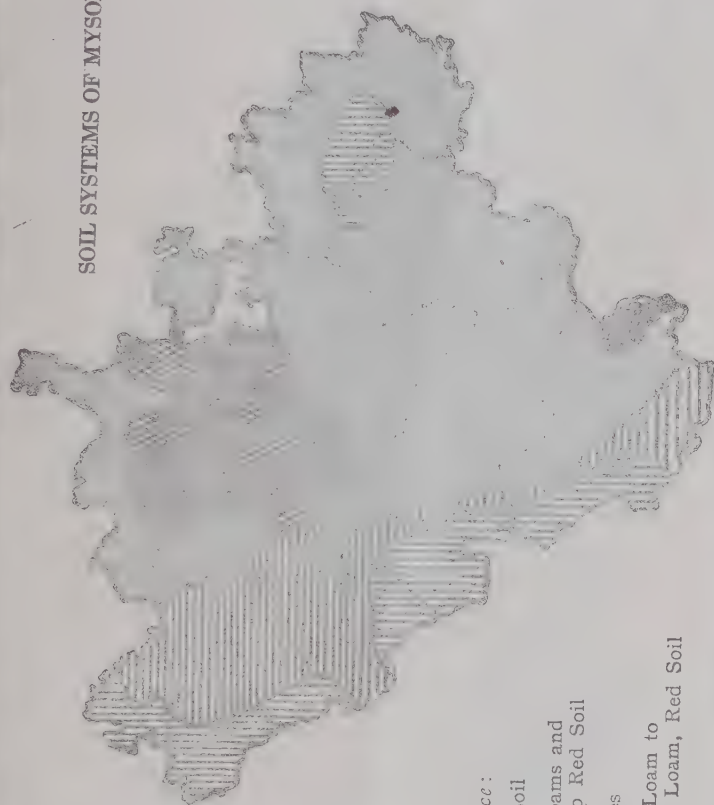
For over a century and a quarter, new varieties of plants, vegetables and economic crops of importance have been imported and tested by the Department of Government Gardens. New crops and seeds of promising varieties of staple crops were introduced since the starting of the model farm near Lalbagh in Bangalore over sixty years ago. However, systematic crop breeding work was organised after the reorganisation of the Agricultural Department in 1914; and since then a regular survey, study and testing of local varieties of crops and isolation of superior strains possessing high yield and disease resistance by selection and hybridization is being carried out besides introduction and acclimatisation of superior exotic strains by the Botanical Section.

The work of the Section has been recently augmented by breeding schemes. Subsidised by the Mysore Government, Indian Council of Agricultural Research, Indian Central Cotton Committee, Indian Central Oilseeds Committee, Indian Central Coconut Committee and Indian Central Sugarcane Committee.

Several strains of merit of the several crops from the point of view of yield and trade have been recommended for cultivation from time to time. The following is a list of such varieties recommended for cultivation with a brief description of Botanical and Agronomic qualities.

RAGI:—*Eleusine Coracana*:—The crop is very important. It occupied more than a third of the cultivated area in the State. The annual production exceeds a crore of pallas of the annual value of Rs. 1,00,00,000.

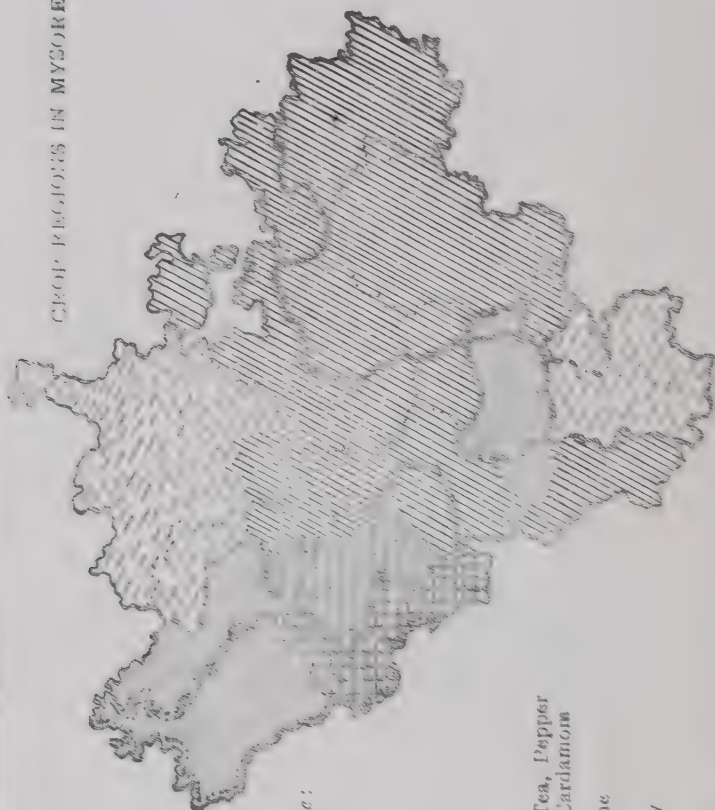
SOIL SYSTEMS OF MYSORE STATE



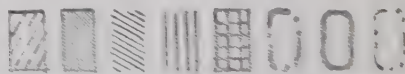
Reference :

- Black Soil
- Red Loams and Deep Red Soil
- Laterites
- Sandy Loam to Red Loam, Red Soil

CROP REGIONS IN MYSORE STATE



Reference :



Jola

Paddy

Ragi

Coffee

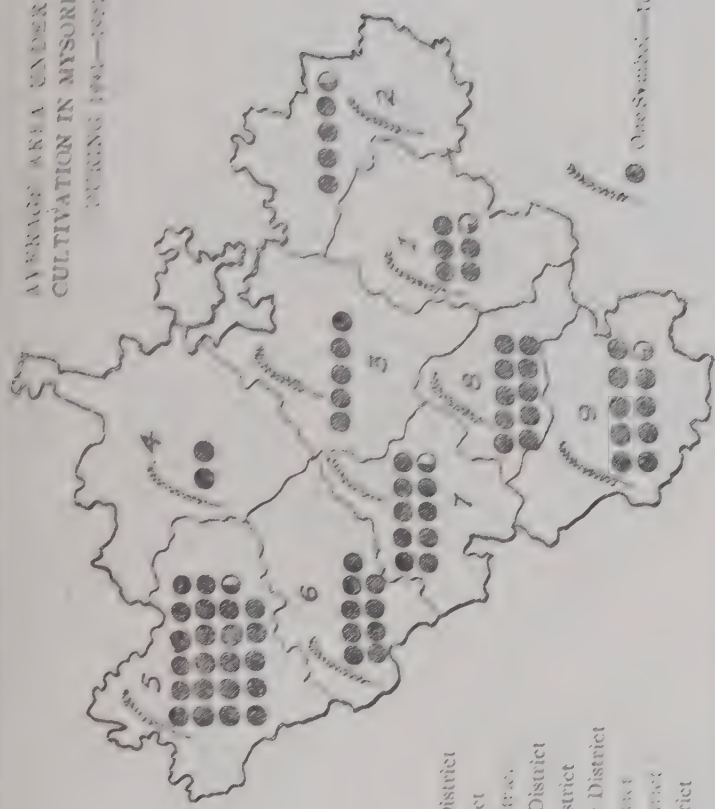
Coffee, Tea, Pepper
and Cardamom

Sugarcane

Mulberry

Other

AVERAGE AREA UNDER PADDY
CULTIVATION IN MYSORE STATE
DURING 1901-1902.

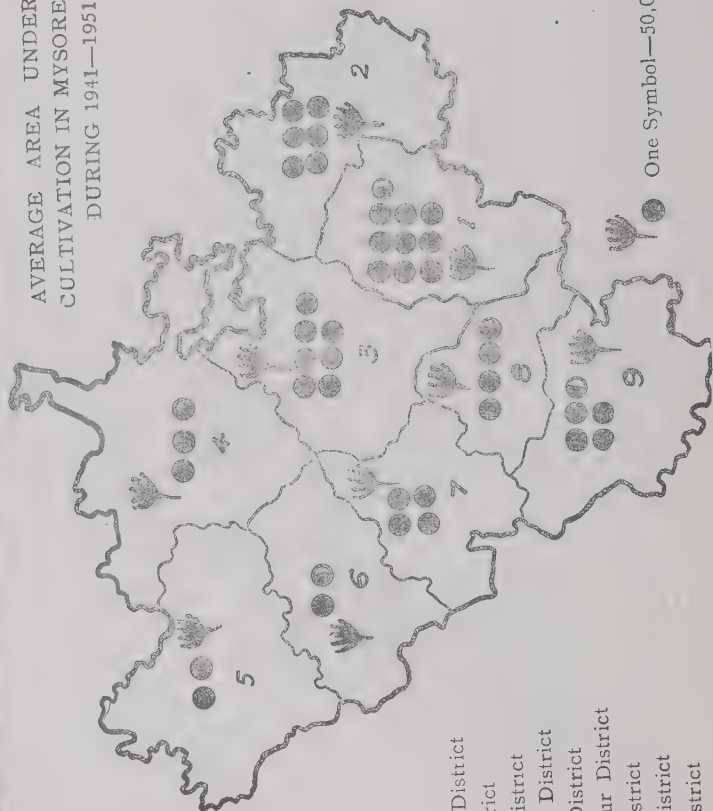


Legend.

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

One Dot = 1000 Acres

AVERAGE AREA UNDER RAGI
CULTIVATION IN MYSORE STATE
DURING 1941—1951.

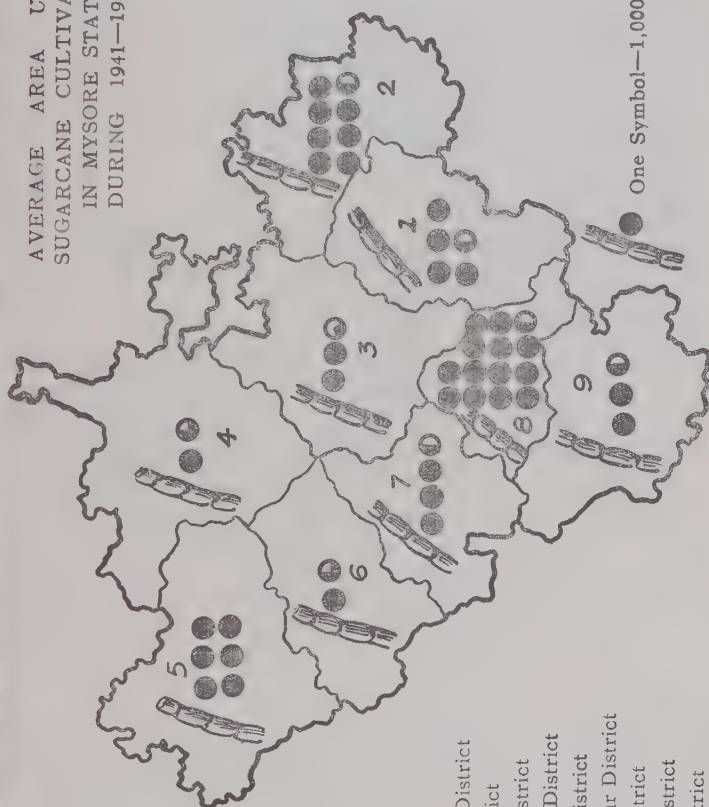


Reference :

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

One Symbol—50,000 Acres.

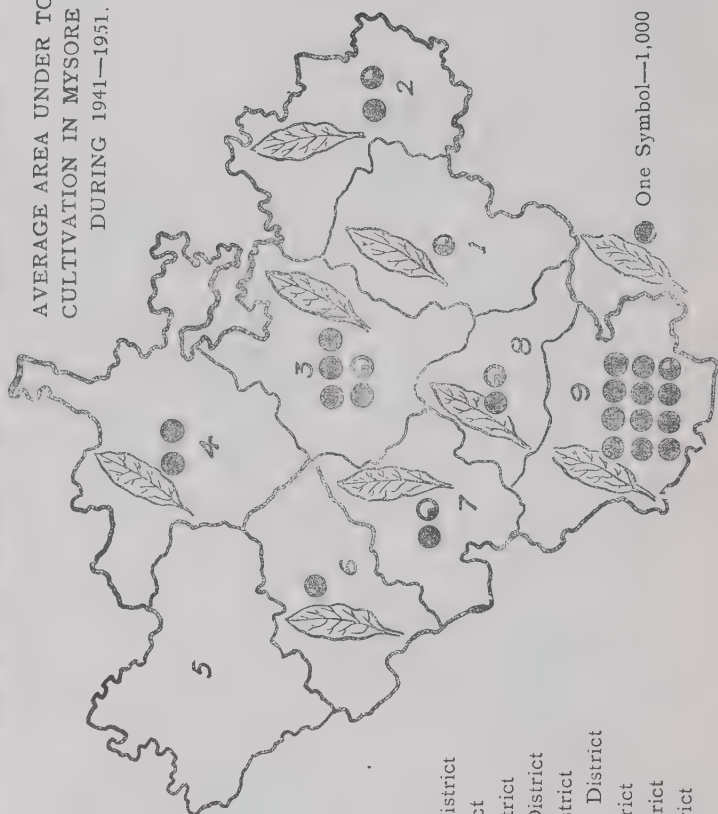
AVERAGE AREA UNDER
SUGARCANE CULTIVATION
IN MYSORE STATE
DURING 1941—1951



Reference :

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

AVERAGE AREA UNDER TOBACCO
CULTIVATION IN MYSORE STATE
DURING 1941—1951.



Reference

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

- KAR RAGI:— April-May sowing.
 (1) K. 1: Green compact earhead.
 Duration: About four months.
 Yield: 6 pallas per acre.

It is one of the departmental selections which is very popular in *kar* tracts and occupies several thousand acres.

- (2) R. 0871: Violet compact earhead.
 Duration: 125 days.
 Yield: $6\frac{1}{2}$ pallas per acre.
 A selection from Coimbatore variety.
 (3) R. 0009: Green compact earhead.
 Duration: About 4 months.
 Yield: 6 pallas.
 An early maturing selection from Coimbatore variety.

- HAIN RAGIS: July sowing.
 H. 22: Violet open earhead.
 Duration: $4\frac{1}{2}$ -5 months
 Yield: 8 pallas.
 Suited to low lands, rich and heavy soils.
 Yields abundant straw.
 A local Madayyanagiri selection and one of the early introduction which is very popular and cultivated on a large scale over tens of thousands of acres.

- R. 0870: Violet compact earhead.
 Duration: $4-4\frac{1}{2}$ months.
 Yield: 8 pallas per acre.
 Suited to high lands, poor and light soils.
 One of the selections from Coimbatore variety, more drought resistant than H. 22.

- R. 0883: Green compact earhead.
 Duration: 4 months.
 Yield: 7 pallas.
 Suited to poor soils. One of the selections from Dharani Ragis.

- R. 0833: Violet compact earhead.
 Duration: 110 days.
 Yield: $6\frac{1}{2}$ -7 pallas per acre.
 A selection from Dharani Ragi.

IRRIGATED RAGIS:— Monsoon and Summer sowing.

- R. 0324: Violet branching.
 Duration: 110 days.
 Yield: 12 pallas of grain; 5000 lbs. of straw per acre.
 One of the selections from Coxcomb; best suited for summer cultivation.
 R. 0786: Green compact.
 Duration: 120 days.
 Yield: 14 pallas of grain; 5000 lbs. of straw per acre.

One of the selections from Nati ragi and suited for cultivation in monsoon and summer.

JOLA (*Sorghum*):—The crop is next in importance to Ragi as dry land crop and occupies about $6\frac{1}{2}$ lakhs of acres. The annual production is about $1\frac{1}{2}$ millions pallas of grain. The crop is cultivated as a grain and fodder crop

S. 2: Compact earhead with red glume.

Duration: 5 months.

Yield: 2-3 pallas of grain; 1000-1500 lbs. of straw per acre.

One of the selections from local Bili Jola suited for cultivation during September and October in black soils.

S. 22: Semi compact earhead; bold grains.

Duration: $4\frac{1}{2}$ -5 months.

Yield: 2-3 pallas of grain; 1000-1500 lbs. of straw per acre.

One of the selections from Maldandi of Raichur; suitable for cultivation during September and October.

SMALL MILLETS:—Cultivated on a small scale in the State.

BARAGU:—(*Panicum Miliaceum*):—

B. 79	}	Black grain.
B. 87		
W. 78	}	White grain.
W. 79		

SAME:—(*Panicum Miliare*):—

P. M. 48	}	Bold grain.
P. M. 52		
P. M. 33	}	Medium grain.
P. M. 36		

HARAKA: *Palpalum Sciobiculatum*):— P. S. 117.

OODALU: *Echinocloa frumentacea*):— E. F. 42.

The above selections from the local varieties have been evolved under the breeding scheme for small millets financed by the Indian Council of Agricultural Research and seem to be promising, recommended for trial.

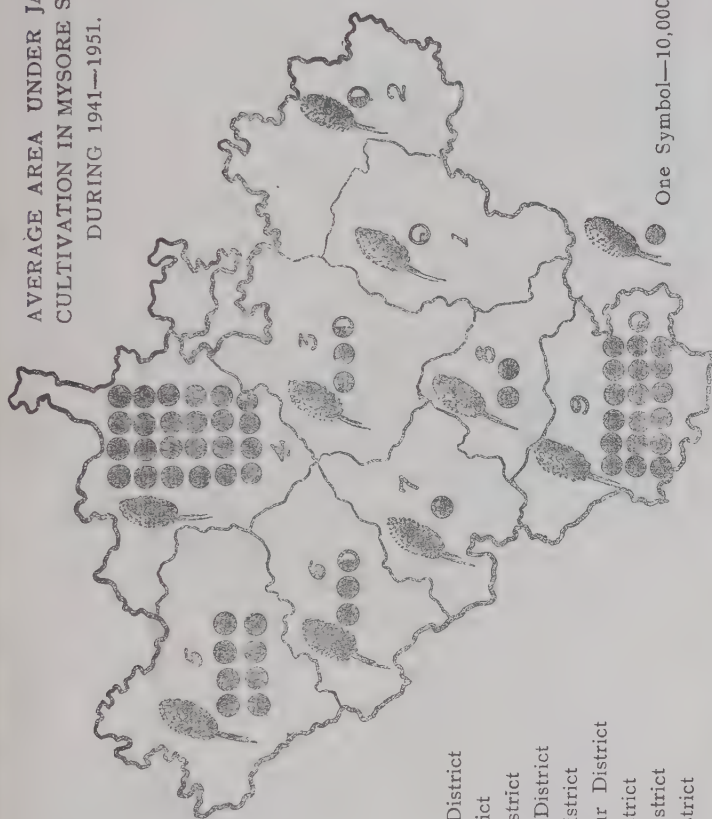
PULSES:—Pulses an important crop, grown throughout the State occupy an important place in rotation and in mixed cropping of the province. The area under cultivation is approximately 11,40,000 acres. There is deficit in the production of pulses in the State. The imports are much greater than the exports. Breeding work on several important pulses—togari, hurulavare and soyabean—is being taken up under a scheme subsidized by Indian Council of Agricultural Research.

The following strains recently evolved, which are highly promising and recommended for cultivation.

TOGARI:—(*Cajanus Cajan*):—

Tho. 137-01	}	All these are drought resistant, free from disease, and good yielders.
142-012		
206-056 and		
214-059		

AVERAGE AREA UNDER JAWAR
 CULTIVATION IN MYSORE STATE
 DURING 1941—1951.

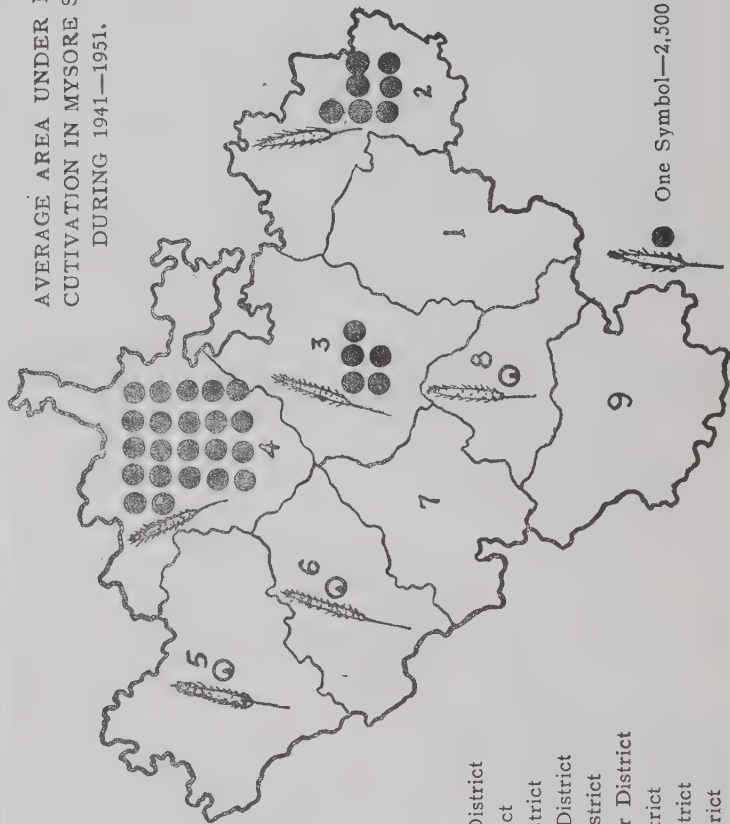


One Symbol—10,000 Acres.

Reference :

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

AVERAGE AREA UNDER BAJRA
CULTIVATION IN MYSORE STATE
DURING 1941-1951.



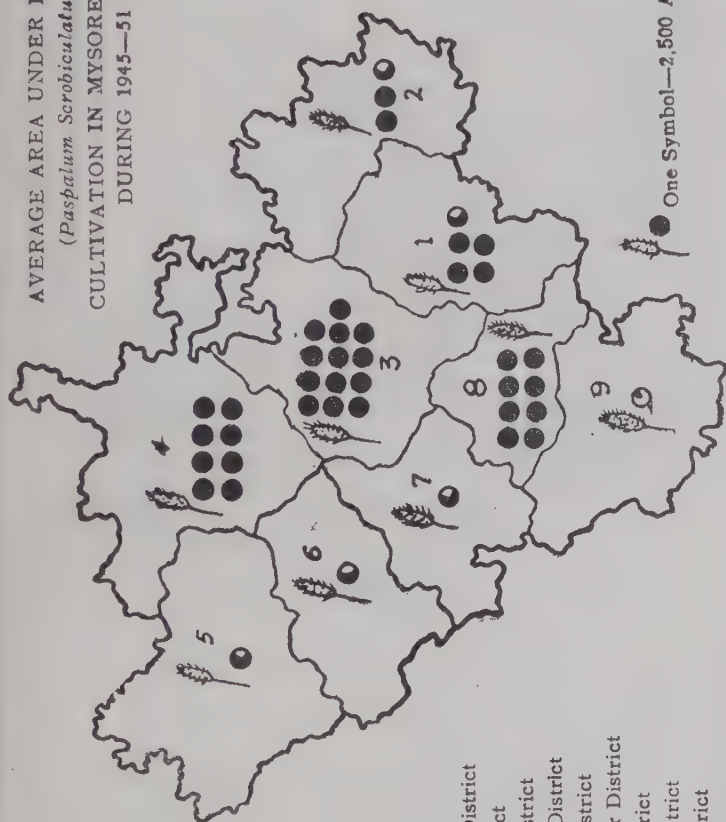
One Symbol—2,500 Acres.

Reference :

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

AVERAGE AREA UNDER HARAKA
(*Paspalum Scrobiculatum*)

CULTIVATION IN MYSORE STATE
DURING 1945-51

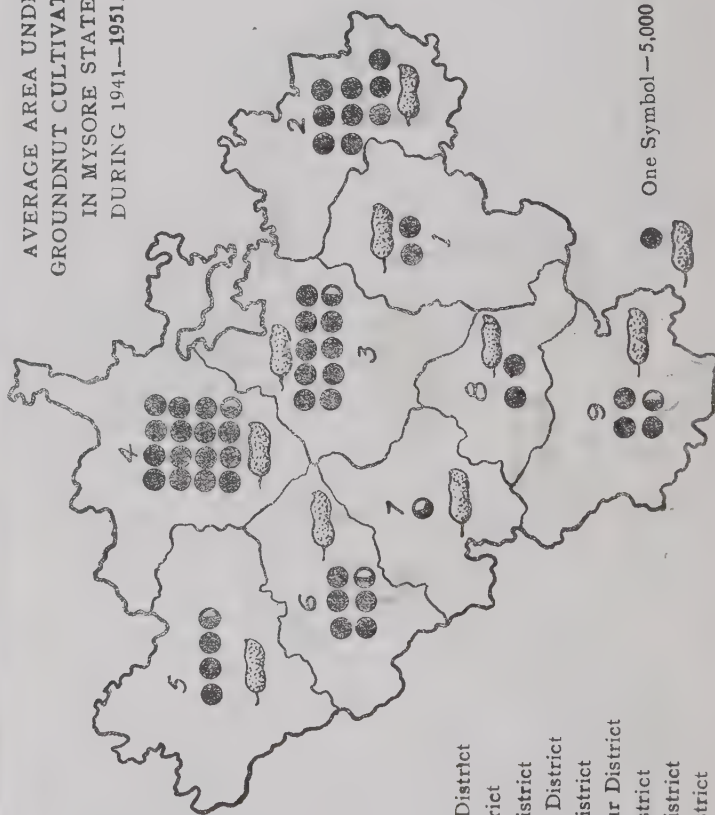


Reference

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

One Symbol—2,500 Acres.

AVERAGE AREA UNDER
GROUNDNUT CULTIVATION
IN MYSORE STATE
DURING 1941-1951.

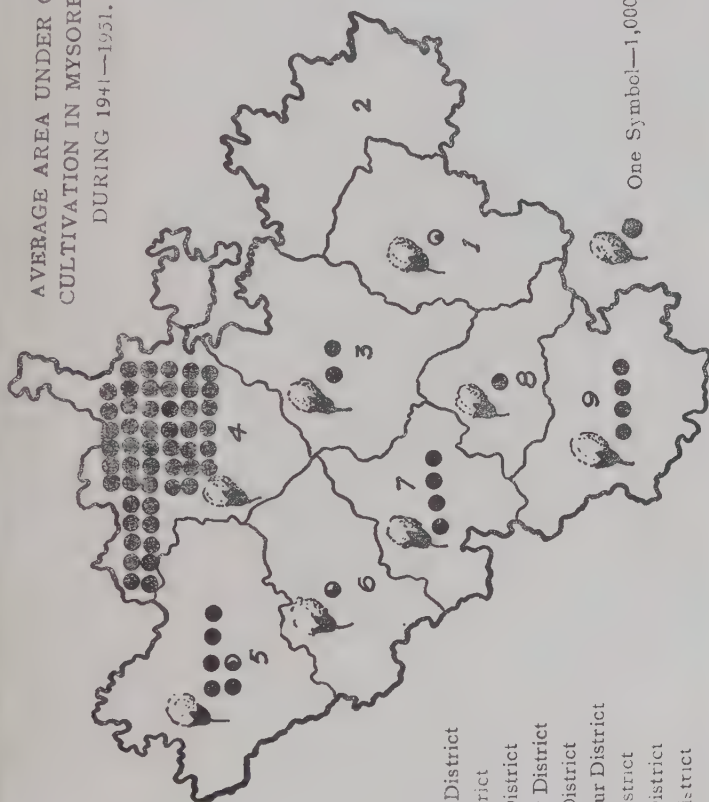


Reference :

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

One Symbol — 5,000 Acres.

AVERAGE AREA UNDER COTTON
CULTIVATION IN MYSORE STATE
DURING 1941—1951.



Reference :

1. Bangalore District
2. Kolar District
3. Tumkur District
4. Chitaldrug District
5. Shimoga District
6. Chikmagalur District
7. Hassan District
8. Mandya District
9. Mysore District

BENGAL GRAM:—Kadale, suitable to our conditions which are of economic value and recommended are Selections from 1) Gundlupet 2) T. Narasipur, and 3) Kallamath.

SOYABEANS:—Two varieties which are heavy yielders and recommended are, White Mammoth and K. 16.

GROUNDNUT:—The crop is one of the important sources of oil and occupies about a third of the total area of oilseeds in the State. It is also an important cash crop to the dry land farmer.

H. G. 1: A natural hybrid between Big-Japan and Spanish.
Duration: $4\frac{1}{2}$ months.

Yield: 1,000 lbs. of nut in shell.

A bunch variety drought resistant and fairly resistant to ticca leaf spot; pods 2-3 seeded; medium; shelling percentage 70-73; kernels medium in size and light rose in colour; total oil content 48-49 per cent.

Extensively grown in Mysore, Hyderabad and Madras; recommended for light, medium soils.

H. G. 3: A bunch hybrid strain from Barbados and Spanish.
Duration: 4 months.

Yield: 900-1,000 lbs. of nuts in shell.

Pods medium, smooth; 2-3 seeded; shelling percentage 70-72; kernels medium and pale rose in colour; total oil content 48-49%; yields a greater amount of haulms; recommended for cultivation in place of Spanish.

G. 0343: A bunch hybrid strain from the Valencia and H.G. 1.

Duration: $4\frac{1}{2}$ months.

Yield: 1000-1200 lbs. of nuts in shell.

Pods long and fingerlike with red seeds; shelling percentage 65 by weight; total oil content 45-46%; suitable for roasting and table.

G. 0553: A hybrid bunch strain from Spanish and Small Japan.

Duration: 4 months.

Yield: 800-1000 lbs. of nuts.

One of the early strains.

A. H. 25: A spreading strain from Madras.

Duration: $5-5\frac{1}{2}$ months.

Yield: 1000-1200 lbs. of nuts.

Cultivated in Kolar and Tumkur Districts; long duration crop.

Cocoanut:—One of the important garden crops of the State and occupies an area of 1,70,000 acres.

Seednuts from selected mother plants growing in Arsikere, Tiptur, Chicknayakanahally, Hiriur are being distributed from Hiriur Farm and Nurseries started under the Cocoanut Nursery scheme sanctioned by the Indian Central Cocoanut Committee.

Castor:—The crop is one of the important cash crop for the dry land farmer and is a major source of oil in the State, occupying about 15% of the total area under oil seeds. It is cultivated as pure and as Akkadi crop.

- L. 53 } Selections from local varieties.
 L. 54 } Duration: 6-8 months.
 L. 242 } Yield: 250-300 lbs. of seed.

Medium height; much branched; spikes many and short; capsules medium; green stem with bloom. Oil content 47%. Suited to areas of scanty rainfall; drought resistant.

- L. 73 } Selections from Mattihalli castors.
 L. 74 } Duration: $4\frac{1}{2}$ -6 months.
 L. 77 } Yield: 350 lbs. per acre.

Vigorous tall: sparsely branched; red stem with bloom, spikes 12"-18" long and densely covered 48-49%. Suited to areas of medium rainfall.

- L. 280: One of the varieties from Hyderabad.

Duration: $4\frac{1}{2}$ -5 months.

Yield: 300-350 lbs. per acre.

Medium tall with rosy stem, bloomy; seeds rosy medium. Suited to areas of medium rainfall.

Sugarcane:—Sugarcane holds a pre-eminent position as a cash crop in the State and occupies an area of about 45,000 acres.

Sugarcane breeding work was started in 1912 and has received an impetus by the breeding scheme financed by the Indian Central Sugarcane Committee and Indian Council of Agricultural Research. A special feature of sugarcane breeding in Mysore has been the utilization of irradiation for evolution of new types.

Except for chewing purposes when Rastali and Pattapatti canes are grown to a little extent near cities, almost the entire area is cultivated with improved strains released by the Department, viz. H. M. 89, 320, 544 and 553. H. M. 89 and 320 have also been popular in Bombay Presidency. H. M. 320 is one of the richest canes in India and has been very popular and formed the basis for running the sugar factory. It is a late sparsely arrowing cane, ripening in 12 months and has a sugar content of 18-20%. It is an all round cane being planted every month and allowed to grow for 12-18 months or more before being harvested for the factory. It is also highly tolerant to mosaic.

H. M. 661, a cross between sugarcane and Teosinte, has also been great success. It is a very vigorous rich and high yielding cane.

I. C. 137, 29 and 8 have done exceedingly well in the Sugarcane Factor Farms.

Of the several Coimbatore canes Co. 290 has been fairly good particularly for saline and heavy water logged soils and Co. 419 has given high yield under good cultivation.

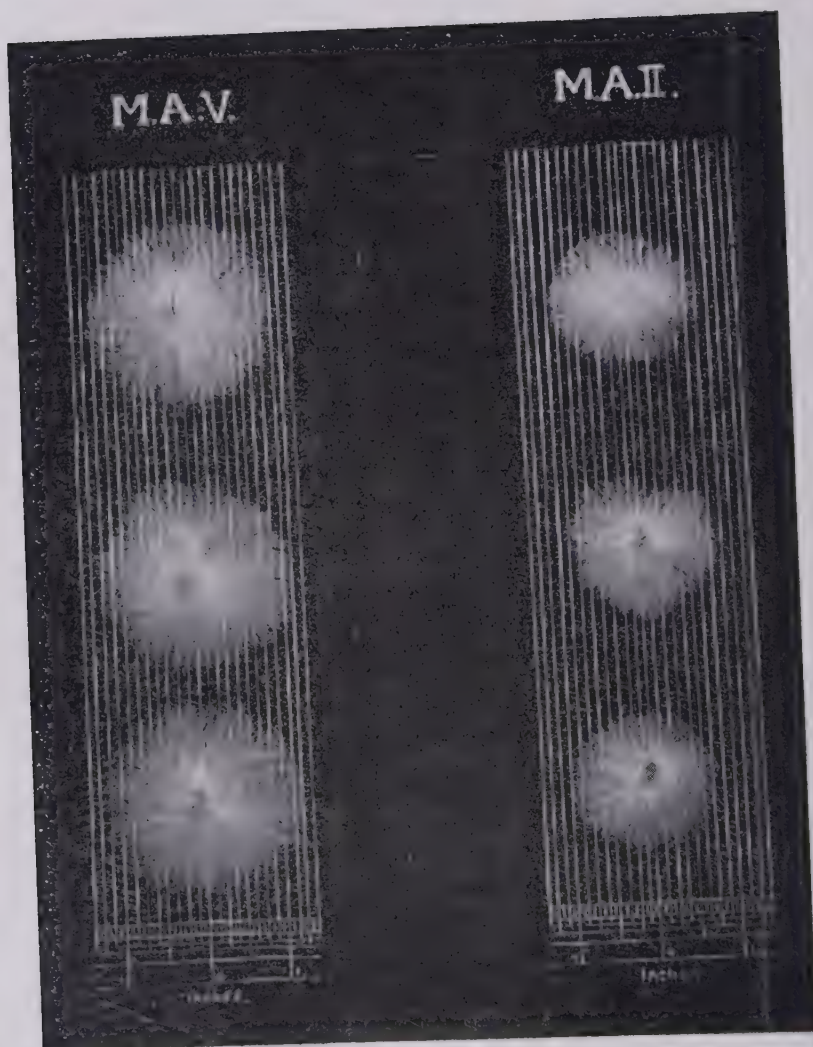
Cotton:—Cotton is one of the most important cash crops of the State and occupies an area of about 80,000 acres.

The main varieties under cultivation are the local Sannabatti (*G. Herbaceum*) in the black cotton soil in the north which forms the bulk of the crop and the local Doddahatti (American cottons of New Orleans of Upland Georgia type) in red soils in parts of Hassan, Chitaldrug and Shimoga District. In the black cotton soils of Mysore District, Nadam (*G. Obtusifolium*) cultivated on a small scale. Bokda (*G. Cernum*) is also cultivated on small area in the north.

Cotton breeding has been in progress since 1917 and has been greatly augmented since 1935 by the breeding schemes subsidised by the India



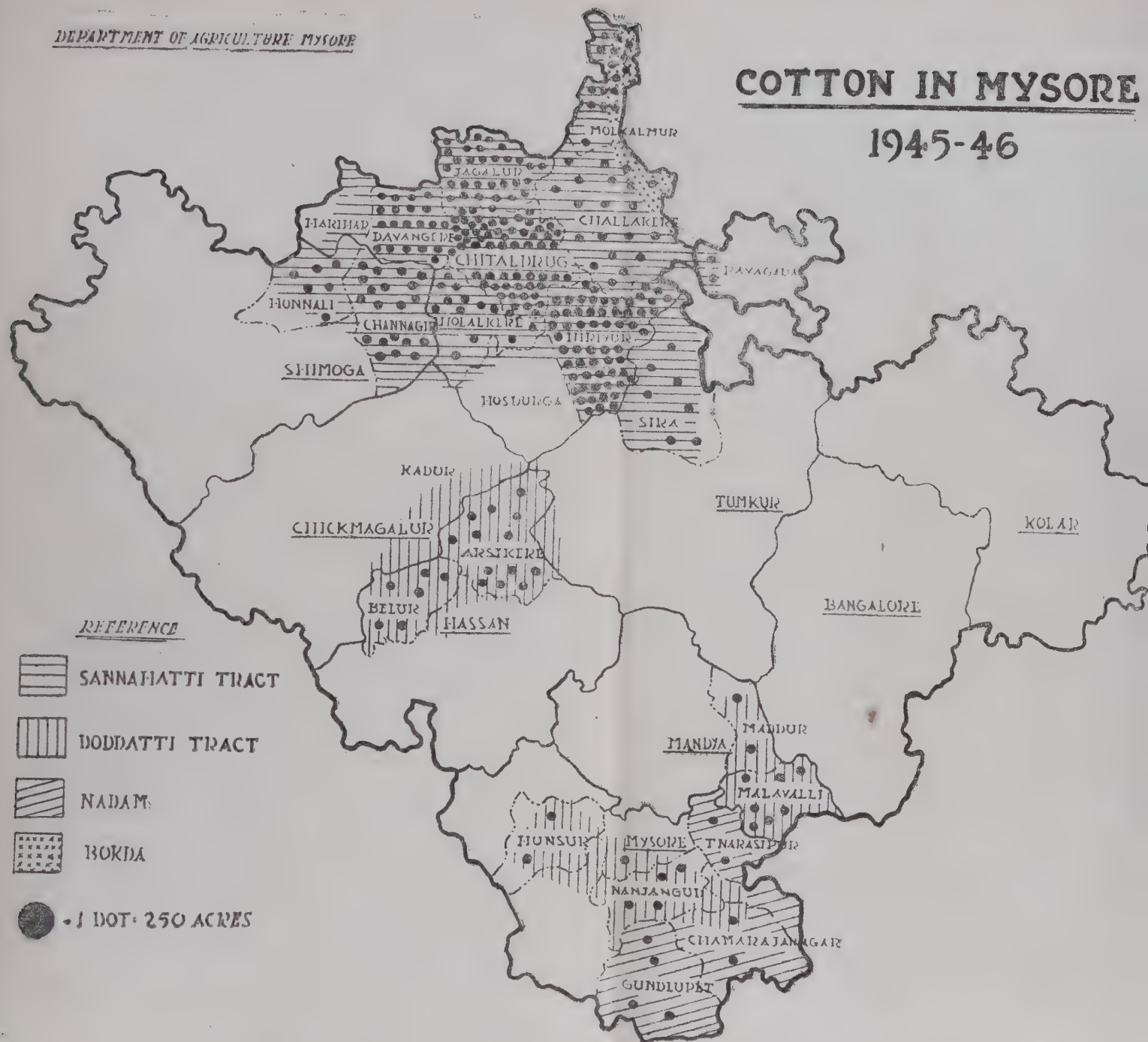
M. A. V Plant in bearing.



Improvement in Cotton by breeding.

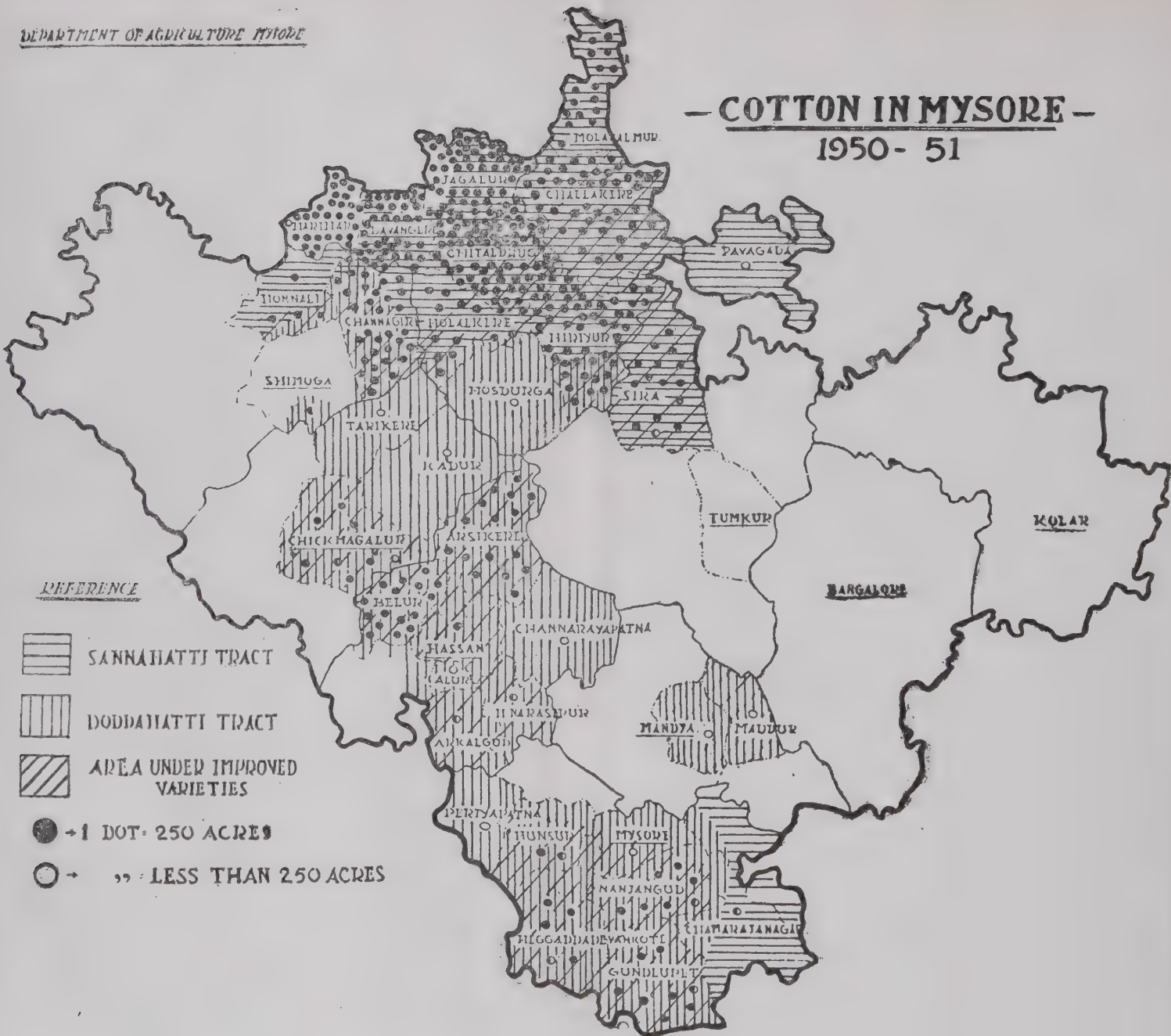
COTTON IN MYSORE

1945-46



- COTTON IN MYSORE -

1950- 51



Central Cotton Committee and the Cotton Seed Distribution Scheme partly financed by the Government of Mysore.

The following strains have been recommended for cultivation :—

S. 69: A selection from the local Sannahatti.
 Staple length : 18-21 mm.
 Ginning : 26%
 Counts : 20 to 30^a
 Yield : 250-300 lbs. per acre.

Has been very popular and practically replaced the original Sannahatti,

H. 190: A strain isolated from a cross between S. 69 and Arboreum.
 Staple length : 21-23 mm.
 Ginning : 30%.
 Counts : 30^a to 35^a
 Yield : 250-300 lbs. per acre.

M. A. V.: A strain isolated from a cross between Co. 2 and Uganda.
 Staple length : 1½"
 Ginning : 35%
 Counts : 36^a
 Yield 800 lbs. per acre under irrigation.

Fruits:—Improved varieties of the following fruits are available for distribution from the Fruit Research Station, Hessaraghatta. The plants recommended are the outcome of research work done under the Fruit Research Scheme sanctioned by the Indian Council of Agricultural Research.

Apples:—Rome Beauty, Glengyle red, and Christmas varieties on Northern Spy stock are recommended. Enquiries may be made for a very limited number of young plants on other improved stocks.

Figs:—Figs recommended are Bezwada, Poona, Bangalore and Myceran. Of the Papayas, Honeydew, Washington and Bangalore are in demand. Amongst Pineapples, Mauritius, Queen and Kew Giant, in Guava, Safeda, Seedless Benares, and Allahabad are in demand. Selected and good yielding plants of Sapota, Butter Fruits, Pomegranates and Grape varieties are also distributed.

Dry Paddies:—Of the several new strains of dry paddy varieties tried, the following which give good yield and can be successfully grown under moderate rainfall are recommended. These varieties on the average give an yield of 6-8 pallas to acre; Anklo 6, Anklo 1-4, Panaji 1-4, and Sarani 10-5.

Wheat:—Hard or spelt wheat varieties recommended are selections from Bageshpur and Sira, and C-13 and 1. P-120 of the soft wheat types.

Medicinal Plants:—There are various medicinal plants in Mysore which are either under cultivation or found wild. Besides these, there seems to be great possibility for the cultivation of the following on commercial scale.

Senna:—The seeds from the Tinnevely have been found to be eminently suited to our conditions.

Pyrethrum:—Of the several samples of seeds received, the seeds got from Kenya are suited for cultivation. It flowers and set seeds profusely and Pyrethrum content of the seeds varieties upto 1.1%

Taraxacum
 Fennel
 Rhuburb
 Belladonna
 Hyoscyamus

} These crops are suited to our conditions and successful crops can be raised.

Essential oils :—There is a keen demand for essential oils plants. The following can be cultivated on a commercial scale in the State.

Geranium :—Of the several of the varieties tried the French variety has been found to possess superior oil contents and cuttings from these have been distributed.

Patchouli	} Good varieties of these are being distributed and wider cultivation encouraged.
Oscimum	
Vetivert	

Grasses :—Of the several various local and exotic grasses tried for fodder the following grasses seem to be best.

Guinea grass :—Thrives very well under heavy manuring and irrigation and provides several cuttings per year. It is one of the cheapest grasses for dairy purposes and commercially cultivated on a large scale round about Bangalore.

Rhodes grass :—Though this grass can persist in dry lands it thrives well only under heavy manuring and irrigation. It is a good grass and is being cultivated on a large scale round about Bangalore for dairy purposes. *Napiergrass* (thin variety) thrives well in dry lands and gives heavy yield under favourable rainfall conditions. *Panicum antidotale* thrives well. *Mosquito grass* which is reputed to be an antidote against malarial mosquito comes up well in moist conditions.

HORTICULTURAL NOTES

Plants suitable for Shrubbery

Single Specimens Shrubs

Allamanda neriifolia	Namiltonia var azurea
Bauhinia Galpinii	Ixora vars
Bougainvillea vars	Kopsia fruticosa
Buddleia vars	Lagustrum robustum
Brunfelsia americana	Lagerstroemia indica
Cestrum diurnum	" indias var alba
Cestrum nocturnum	Murraya exotica
Congea tomentosa	Malpighia coccifera
Dombeya vars	Ochna squarrosa
Erythrina vars	Poinsettia pulcherrima (scarlet)
Franciscea uniflora	Poinsettia plioherrima
Gardenia florida	plenissima (double scarlet)
Habrothamnus vars	Petræa volubilis
Hibiscus vars	Roupellia grata
Hamelia patens	Ravenia spectabilis
Holmskioldia sanguinea	Tecoma vars
Namiltonia suaveolens	

Plants suitable for Shrub Beds

Acalypha vars	Meyenia
Achania malvaviscus	Poinsettia
Beloperone oblongata	Pentas carnea coccinea
Brugmansia suaveolens	" " alba
Eranthemum vars	Ruellia amoena
Galphimia glauca	Russelia juncea
Hibiscus	Tecoma stans
Holmskioldia	Tecoma radicans

Plants suitable for Shrubberies

Acalypha	Meyenia
Acanthus	Murraya exotica
Aralia	Nerium
Barleria	Nyctanthes
Brunfelsia	Poinsettia
Eranthemum	Poinciana pulcherrima
Excocaria bicolor	Panax
Graptopyllum	Polymnia grandis
Hibiscus	Russellia
Hamelia	Sanchezia
Holmskioldia	Strobilanthes
Ixora	Tabernaemontana
Lagerstroemia indica	Verbesina
Ligustrum	Tecoma stans
Malpighia	

Plants for Pot Gardens**Summer Season**

Achimenes	Mignonette
Balsam (Impatiens)	Myosotis palustris
Campanula	Pansy
Canna	Pentstemon
Carnation	Petunia
Coleus	Phlox (Perennial)
Dahlia	Pinks (double)
Delphinium	Primula
Euchsia	Roses
Gloxinia maculata	Rudbeckia
Gerbera	Salvia
Gesnera	Scutellaria
Heliotrope	Violet

Rainy Season

Ageratum	Nasturtium
Coriopsis	Nicotiana
Chrysanthemum	Perennial Aster
Cynoglossum	Perennial Phlox
Cosmos	Salvia
Lupinus	Sunflower
Marigold	Zinnia

Winter Season

Antirrhinum	Larkspur
Brachycome	Lobelia
Cineraria	Mignonette
Clarkia	Petunia
Delphinium	Stock
Godetia	Sweet William
Heliotrope	Viola

Plants suitable for Edgings and Borders

Alternanthera	Strobilanthes anisophyllus
Phalaris arundinacea	Plumbago capensis
Aspidistra lurida	Eranthemum
Iresine	Acaypha Hamiltoniana
Cineraria maritima	Eupatorium heteroclinum
Coleus	Barleria

Plant suitable for Hedges

Bougainvillea
 Clerodendron inerme
 Duranta Ellisia
 Hibiscus rosa-sinensis
 Hamelia Patens
 Lawsonia alba

Ligustrum robustum
 Meyenia erecta
 Murraya exotica
 Dodonaea viscosa
 Tecoma staus

The above mentioned plants are easily propagated by cuttings except Dodonaea viscosa which is propagated by seeds.

Hints on Planting

1. A trench 2' wide, 1½' deep and of the required length should be opened out.

2. The surface soil should be mixed with cattle manure, leafmould or any other organic manure and filled in the trench, and made firm by pressing.

3. The cutting should be planted slantingly at 4" to 2" apart in a straight line, the distance depending upon the kind of hedge used.

Cuttings of Clerodendron inerme should be planted in double rows. In the two rows the direction of the slant should be opposite so that they appear to cross each other.

In the case of Bougainvillea, cuttings are planted at one to two feet apart.

4. The hedge should be watered to keep the soil moist till it is established. Weeds should be removed.

5. The hedge should be allowed to grow gradually to the required height and width.

Composition of potting Soils

1 Annuals—

3 parts ... Horse manure
 1 " ... Red earth
 1½ " ... Sand

2. Soft wooded flower plants such as Geranium, Violet, etc.—

6 parts ... Horse manure
 4 " ... Red earth
 3 " ... Sand
 2 " ... Leaf mould

3. Bulbs and Tubers such as Canna, Dahlia, etc.—

2 parts ... Red earth
 2 " ... Sand
 2 " ... Leaf mould
 2 " ... Manure
 1 " ... Loam
 ½ " ... Charcoal

4. Rose—

6 parts ... Horse manure
 4 " ... Red earth
 3 " ... Sand
 2 " ... Loam

5. Croton.—

4 parts ... Red earth
 4 " ... Horse manure
 3 " ... Sand
 2 " ... Leaf mould
 1 " ... Lime rubbish

6. Palm.—

4 parts ... Leaf mould
 3 " ... Red earth
 3 " ... Sand
 2 " ... Loam
 2 " ... Horse manure

7. Ferns.—

4 Parts ... Leaf mould
 3 " ... Sand
 2 " ... Loam
 2 " ... Horse manure
 1 " ... Brick pieces
 1 " ... Lime rubbish
 ½ " ... Charcoal

8. Begonia.—

4 parts ... Red earth
 4 " ... Horse manure
 4 " ... Leaf mould
 3 " ... Sand
 1 " ... Lime rubbish
 1 " ... Charcoal

9. Carnation.—

6 parts ... Horse manure
 4 " ... Red earth
 3 " ... Sand
 1 " ... Loam
 1 " ... Charcoal

0. Caladium.—

4 parts	... Red earth
4 "	... Horse manure
4 "	... Leaf mould
3 "	... Sand
1 "	... Lime rubbish
$\frac{1}{2}$ "	... Charcoal

1. Dracaena.—

4 parts	... Leaf mould
3 "	... Sand
2 "	... Loam
2 "	... Horse manure
$\frac{1}{2}$ "	... Charcoal

2. Deffenbachia and similar tropical foliage plants—

4 parts	... Leaf mould
2 "	... Sand
1 "	... Loam
1 "	... Peat moss (chopped).
1 "	... Manure
$\frac{1}{2}$ "	... Brick dust
$\frac{1}{2}$ "	... Charcoal

3. Anthurium, Philodendron, etc.—

4 parts	... Leaf mould
2 "	... Sand
1 "	... Manure
1 "	... Charcoal
1 "	... Brick dust
1 "	... Peat moss

14. Orchid.

4 parts	... Peat moss
2 "	... Brick pieces
1 "	... Charcoal
1 "	... Light tank silt.
1 "	... Leaf mould

15. Succulents.—

2 parts	... Red earth and Loam
2 "	... Leaf mould
1 "	... Sand
1 "	... Horse manure
1 "	... Lime rubbish

16. Ornamental shrubs and creepers.

5 parts	... Red earth
4 "	... Sand
4 "	... Horse manure
2 "	... Leaf mould

17. Fruit Plants.—

4 parts	... Red earth
2 "	... Sand
1 "	... Horse manure
1 "	... Sheep manure

18. Soft and hard wood cuttings.—

1 part	... Leaf mould
$1\frac{1}{2}$ "	... Red earth
1 "	... Sand

19. Seeds.—

3 parts	... Leaf moulds
$1\frac{1}{2}$ "	... Red earth
$1\frac{1}{2}$ "	... Sand

Guide to Cultivation of Vegetables

The chief requirements of a vegetable garden are a site which is fairly elevated and has a gentle slope, a well-drained loamy soil, a good supply of water which is free from alkalinity, protection from wind, and the shade and roots of large trees. Root crops thrive well in sandy loam soils as they allow free development of the under-ground portion.

The best time for commencing the garden operations is when the south-west monsoon starts, which is generally at the end of May or the beginning of June. To start with, drains should be constructed to take away storm water, otherwise damage will be caused to the plants during heavy rains either by washing off or stagnation of water. Then the roads and foot-paths should be formed. The land should then be trenched or deeply dug to a depth of about 2' for cultivating vegetables. Crops belonging to the same family should not be grown in the same plot over and over, but certain rotation of crops as noted below should be followed as it checks pests and diseases, regulates plant nutrition in the soil and keeps it in average fertility. A leguminous crop should be rotated with a non-leguminous crop as the former supplies Nitrogen to the soil which is beneficial to the latter; a shallow rooted crop should be rotated with a deep rooted one as this method of cultivation has wholesome effect on the mechanical condition of the soil. Cabbage, Lettuce, Cauliflower and Leek may be followed by Radish, Carrot, Beet-root crops which may further be followed by peas and beans as they add nitrogen to the soil. Potato may be grown to succeed any crop other than the one belonging to the Natural order, Solanaceæ.

Vegetables can be divided into two main groups: (1) European vegetables (2) Indian vegetables. The time of sowing, seed rate, time of transplanting, distance of planting, time of harvesting and other important cultural hints are given briefly in the following pages.

An application of a general manure, such as Farmyard manure or Town sweepings at the rate of 25 to 30 cart-loads is usually amply repaid not only by a larger yield but also by a better quality of crop. The necessary manurial ingredients required by the vegetable crops are found in the general manures.

The after cultivation consists of watering regularly and copiously, weeding the whole plot as often as necessary and stirring the soil after every irrigation to maintain the soil mulch which minimises evaporation and checks the growth of weeds.

It is usual to grow vegetables in an orchard until the trees spread. This intercultivation is beneficial to the garden as it will not only keep the weeds down but will also enrich the soil.

Except during heavy rains, most of the European vegetables may be grown throughout the year provided there is facility for watering. Many vegetables such as cabbages, cauliflower, beet-root and peas which do not grow in the plains could be grown to perfection in Bangalore.

The centre of work in vegetable cultivation is the Government Horticultural Farm near the Lal-Bagh in Bangalore. The Farm is doing very useful work in the cultivation of improved kinds of Temperate and Tropical vegetables, fodders and other economic plants.

(Government Horticultural Farms are recently opened in Maddur and Mandya).

Among the vegetables introduced, mention may be made of the following:—

Sweet Corns.—Black maxican, the Landreth. Money Maker, Howling Mob, Golden Bantam, Kendal's Gaint, Delicious. Bantam Evergreen, the Burpee's Branching, Golden Gaint and Sweet Orange.

Maize.—Golden Beauty, Hickory King and Golden Dent.

Pop Corn.—White Rice Pop, White Pearl Pop and Golden Queen.

Artichoke.—Jerusalem, Green Globe and Early Purple Globe.

Asparagus.—Palmetto.

Beans.—(Yellow-podded vars), Bountiful, Improved Golden Wax, Golden Butter Wax (green-podded vars), Inexhaustible, and Canadian Wonder Lima beans and Velvet beans.

Beet-root.—Egyptian Early Yellow Turnip, Egyptian Extra Early, Long Black Red, Egyptian Dark Red Turnip Rooted, French Trevis Extra Early and Cooper's Sunset.

Brinjal.—Burpee's Black Beauty, Very Long White, Giant of Benares and Long Green.

Lady's Finger.—White Velvet and American Dwarf Green.

Cabbage.—Bloomsdale Large Flat Dutch, Bloomsdale, Large Late Drumhead, Premium Large Late Drumhead, Savoy Perfection Drumhead, Large Red Drumhead, Golden Acre, Sugar Loaf, London Market, Autumn Head Early, Quintal, Earliest Large Solid Drumhead, World Beater, Burpee's Copenhagen Market.

Cauliflower.—Early London, Early Snowball and Large White Cape.

Carrot.—Long Orange, Half Long Scarlet, Chantenay, Half Long Nantes, Early Short Horn, Horn Exhibition.

Celery.—Golden Self-blanching and White Plume.

Capsicum.—Ruby King, Ruby Giant, Bull Nose, Chinese Giant, Sunny Brook, Golden Queen, Sweet Spanish and Pimento.

Knol Khol.—Early White Vienna, Early Purple Vienna, Erfurt, Earliest Forcing, Green Earliest Forcing, Green Earliest Erfurt, Purple Early Smooth, Erfurt Purple Large Green.

Leek.—American Flag, Large Flag or London, Musselburg.

Lettuce.—Hanson, Cabbage Newyork Improved, Drumhead, Naples, Egg Small Solid, Cos Perfection.

Peas.—Little Marvel, the Pilot, First and Best, and American Wonder.

Pumpkin.—Golden Oblong, King of the Mammoth, Cheese White Luxury, Large Red and White.

Parsnip.—Student and Intermediate Short-leaved.

Parsley.—Curled and Glory of Erfurt.

Onion.—Cooper's Prize Taker, Cooper's Market Gardener, Yellow Globe, the Queen, and Paris Silver-skinned.

Radish.—White Icicle, Scārllet Globe, Round White, Golden Globe, Turnip Scarlet, Long Scarlet, Turnip Yellow, Berlin Blood Red Forcing, Neplus ultra, Violet Giant, Chinese Rose Winter, Crimson Giant Rose, Turnip Scarlet Gem, and Long Rose White-tipped.

Turnip.—Early Red Top Flat, Early White Duch, Golden Ball or Orange Jelly, and Beck's Improved Snowball.

Tomato.—Tangerini, Ponderosa, Cooper's Momarch, Peach Blow, the Peach, Landreth's Ten Ton, Golden Queen, Burpee's Matchless, the Landreth, Pear-shaped Red Perfection, Marglobe, Mikado, Prize-Taker, Dwarf Giant, Landreth's Red Rock, Bloomsdale, Carter's Fruit and Oxheart.

Water Melon.—Melon Favourite and Green.

GARDEN
VEGE
European

Sl. No.	Name	Latin name	Natural order	Habitat	Seed rate per acre	Time of sowing seeds
1	Artichoke, Jerusalem,	<i>Helianthus tuberosus</i>	Compositæ	Brazil	... 30 md.	... June to Jan
2	Asparagus	<i>Asparagus Officinalis</i>	Liliaceæ	Europe ; Asia.	2 lb.	... Do
3	Beans "Dwarf French."	<i>Phaseolus vulgaris.</i>	Legumi-nosæ,	Probably S. America,	20-25 lb.	... March to Sept
4	Beans "Lima" "Double"	<i>Phaseolus lunatus.</i>				Do ...
5	Beet-root ...	<i>Beta-vulgaris.</i>	Chenopo-diaceæ,	South of Europe,	3 lb,	... Throughout the year,
6	Cho-cho ...	<i>Sechium edule.</i>	Cucurbi-taceæ,	Persia	... 102 pits. planted with ripe fruits,	Do ...
7	Capsicum ...	<i>Capsicum annum.</i>	Solanaceæ	Tropics	... 8 oz,	... June to Oct,
8	Cabbage ...	<i>Brassica oleracea</i> var <i>capitata.</i>	Cruciferæ	Europe	... 4 6 oz,	... June to Dec.
9	Carrot ...	<i>Daucus Carota</i>	Umbelli-feræ.	Europe	... 4-5' oz,	... May to Oct.
10	Cauliflower	<i>Brassica oleracea</i> var <i>botrytis.</i>	Cruciferæ ...	Probably Italy,	4-6 oz.	... Oct. to Feb.
11	Celery ...	<i>Apium graveolens.</i>	Umbelli-feræ.	Europe including Britain.	5-6 oz.	... Do ...
12	Knol-Khol	<i>Brassica oleracea</i> <i>caulo-rapa.</i>	Cruciferæ ...		1-2 lb.	... June to Dec.
13	Leeks ...	<i>Allium Porrum.</i>	Liliaceæ	... Switzerland	3-4 lb,	... May to Dec,

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TABLES

Vegetables

Time of transplanting seedlings	Distance of planting	Time of harvesting	Remarks
	Rows 1½ feet apart and plant 1 foot apart.	4 months after planting tubers.	Propagated by tubers. Pick off flowers. The tubers should not be lifted until required, as they do not store well and there is no harm in allowing them to remain in the soil.
When plants are 9 inches high.	Rows, 4 feet apart and plants 12 inches a part.	November to Feb. shoots are obtained 10 days after manuring.	Shoots are forced when the crop is 2 or 3 years old. The plot should be dug at least 2 feet deep and the soil should be mixed with stable manure.
.....	Rows 1½ feet apart and plant 1 foot apart.	45 days to 60 days after sowing.	The plants should be earthed up when they put forth 4 leaves.
.....			Sow 1 foot apart in rows 4 ft. apart.
Thinned out seedlings may also be transplanted.	Rows 1 foot apart 6 inches apart.	3 months after sowing.	Sown directly in beds—very hardy and thrives in almost all soils.
	Pits 20 feet apart, 1 fruit in a pit.	4 months after planting.	The matured fruit containing the bud is planted and allow to trail on a pendal or on a tree.
When seedlings are 4 inches high.	Rows 1½ feet apart and plants 1 foot apart.	4 months after sowing seeds.	
When seedlings have 4 to 6 leaves.	Rows 2 feet apart and plants 1½ feet apart.	3½ to 5 months after sowing seeds.	Pick of the seedlings a fortnight after sowing. Cabbage requires very fertile soil and frequent irrigations. The soil should be kept moist. Overmatured leaves should be removed 2 or 3 times.
.....	Rows 1 foot apart and plants 3 inches apart.	3 to 3½ months after sowing seeds.	Sown directly and when the seedlings are 4 inches high, thinning is to be done carefully leaving a distance of three inches from plant to plant.
When seedlings have 6 leaves.	Rows 2 feet apart and plants 1½ feet apart.	4½ months after sowing seeds.	Cauliflower heads have to be covered with leaves. The soil should be kept moist by frequent irrigations.
When seedlings are 6 inches high.	Rows 2 feet apart and plants 9 inches apart.	4 to 5 months after sowing seeds.	When plants grow to 1 to 1½ feet, tie the leaves together and enclose in a bamboo or in aloe leaves so as to exclude light.
When seedlings have 6 leaves.	Rows 1½ feet apart and plants 9 inches apart.	3 months after sowing seeds.	The crop requires heavy manuring and copious irrigation.
When seedlings are 6 inches high.	Rows 1 ft. apart and plants 6 inches apart.	4½ to 5 months after sowing seeds.	As they grow they should have fine rich soil drawn round the stems to ensure their being properly blanched. The most valuable part of the plant is the white underground portion and it is with the object of increasing this that earthing up is necessary.

GARDEN
VEGE.

Sl. No.	Name	Latin name	Natural order	Habitat	Seed rate per acre	Time of sowing seeds.
14	Lettuce ...	Lattuca sativa,	Compositæ...	India and Central Asia.	3 lb. ...	Throughout the year,
15	Maize ...	Zea Mays ...	Gramineæ ...	Southern America,	16 lb. ...	June to Dec,
16	Onion ...	Allium Cepa,	Liliacæ ...	Asia	... 6-8 lb. for seeds, 800-1,000 lb. for bulbs,	May to Sept.
17	Parsnip ...	Peucedanum sativum	Umbellifæræ	Europe	... 3-4 lb. ...	June to March,
18	Parsely ...	Carum Petroselinum	Umbellifæræ	Sardinia	... 2-3 lb. ...	June to Feb.
19	Peas ...	Pisum sativum	Leguminosæ	Western Asia.	45-50 lb. ...	April to October
20	Potato ...	Solanum tuberosm	Solanacæ ...	S, America...	1,000-1,100 lb.	June to July and October to January.
21	Radish ...	Raphanus sativus.	Cruciferæ ...	S. Asia	... 8-10 lb. ...	Throughout the year,
22	Spinach ...	Spinacea oleracea.	Chenopodia-cæ.	N, Asia	... 4-6 lb, ...	Jan. to June
23	Newzealand Spinach.	Tetragonea expansa.	Do	... Australia and Newzealand	4-6 lb. ...	Throughout the year.
24	Tomato ...	Lycopersicum esculentum.	Solanacæ ...	S. America...	3-4 oz. ...	May to Dec.
25	Turnip ...	Brassica rapa,	Cruciferæ ...	Europe	... 3-4 lb. ...	June to March,
26	Vegetable Marrow.	Cucurbita Pepo,	Cucurbitacæ,	Persia	... 1-1½ lb. ...	May to Dec,

Indian

27	Ash gourd,	Benincasa cerifera,	Cucurbitacæ.	India	... ½ lb. ...	June to Dec.
28	Brinjal ...	Solanum melongena	Salonacæ ...	Tropics	... 4 oz. ...	Throughout the year.
29	Bottle gourd.	Legenaria vulgaris,	Cucurbitacæ,	T. Asia	... ½ lb. ...	June to Dec. and Jan. to Feb.

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TABLES—*contd.*

Time of transplanting seedlings	Distance of planting	Time of harvesting	Remarks
Thinned out seedlings may also be transplanted.	Rows 1 ft. apart and plant 6" apart,	1½ months after sowing seeds.	Seeds are sown directly in beds.
...	Rows 2 ft. apart and plants 1 ft. apart	2½ to 3½ months after sowing seeds.	Side shoots should be removed. This need not be done in the case of "Sugar Corn".
30 to 40 days seedlings of 6" height	Rows 1 ft. apart and plants 6" apart,	4 months after sowing seeds.	When the tops wither it is the sign that the crop has matured.
...	Rows 1½ ft. apart and plants 9" apart,	Do	The crop thrives best in deep loamy soil.
...	Rows 1½ ft. apart and plants 9" apart,	4 months after sowing seeds,	The crop thrives well in well-manured friable loamy soil.
...	Rows 3 ft. apart and plants 3" apart,	2 to 3 months after sowing seeds,	When the plants are about 6 inches high, they should be staked. When the pods are well set pinch of the leading shoots to check the growths of the vine so that the pods may develop well.
...	Rows 1½ ft. apart and plants 1 ft. apart,	3 to 4 months after planting tubers,	Propagated by tubers whole and cut. The plants have to be earthed up a month after planting.
...	Rows 1 ft. apart and plants 3"—4" apart,	1 to 2 months after sowing seeds,	The crop should be forced to grow rapidly by manuring and irrigation in order to get crisp tender roots.
...	Rows 1 ft. apart and plants 1 ft. apart,	2 months after sowing seeds.	Sow directly in beds. Flowering should be nipped off.
...	Rows 1 ft. apart and plants 1 ft. apart,	...	Do
When seedlings are 4" high	Rows 4 to 5 ft. apart, apants 1½ ft. apart,	4 months after sowing seeds.	Remove side branches and stake the plants.
...	Rows 1 ft. apart and plants ½ ft. apart	2 to 2½ months after sowing seeds.	This requires light loamy soils and this will not thrive if the land is deficient in lime.
...	Pits 15 ft. apart, 4 seeds in a pit about 1 ft. from plant to plant.	2½ to 3 months after sowing seeds.	This crop thrives best in very rich porous loam and requires plenty of moisture in the soil.
Vegetables.			
...	Pits 15 ft. apart, plants 1 ft. apart, 3 plants in a pit.	4 to 5 months after sowing seeds,	The pits should be manured with farm yard manure and ashes.
When seedlings are 4" high	Rows 3 ft. apart, and plants 1½ ft. apart,	4½ to 5 months after sowing seeds,	The crop requires rich loamy soil.
...	Pits 15 ft. apart 3 plants in a pit, sowing seeds 1 ft. apart,	4 months after sowing seeds	he pits should be manured with farm yard manure and ashes. This can be grown throughout the year.

Sl. No.	Name	Latin Name	Natural order	Habitat	Seed rate per acre	Time of sowing seeds
30	Bitter gourd	Memordica Charanita	Cucurbitaceæ,	India	... 1½ lb	... May to Oct.
31	Chillies ...	Capsicum annum,	Solanaceæ	S. America and India	4-6 oz	... Throughout the year
32	Cucumber...	Cucumis sativus.	Cucurbitaceæ	N. India	... 2½ lb.	... June to Oct.
33	Cluster beans.	Cyamopsis psoralioides.	Leguminosæ	India	... 1½ lb,	... May to Oct.
34	Indian greens,	...	...	Do		March to August.
35	Lablab ...	Dolichos Lab lab,	Leguminosæ	...	...	March ...
36	Lady's fingers.	Hibiscus esculentus,	Malavaceæ	India and Tropical Countries	6-8 lb.	... March to October
37	Snake gourd,	Tricosanthes anguina.	Cucurbitaceæ.	Do	... 1½ lb.	... March to August,
38	Sponge gourd,	Luffa acutangula,	Do	Trop. Asia	1½ lb.	... Feb. to Oct.
39	Sweet potato,	Ipomoea batatas.	Convolvulaceæ	America	... 5000 strips	Throughout the year.

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TABLES—*concl'd.*

Time of transplanting seedlings	Distance of planting	Time of harvesting	Remarks
...	Pits 10 ft. apart 3 seeds in a pit at 1 ft. apart.	3 to 4 months after sowing seeds.	The pits should be manured with farm yard manure and ashes. This can be grown throughout the year.
When seed- lings are 4" high	Rows 2 ft. apart, plants 1 ft. apart,	4 months after sowing seeds.	Thrives best in rich loamy soil.
...	Pits 10 ft. apart, 4 seeds in a pit at 1 ft. apart.	3 to 3½ months after sowing seeds,	The crop thrives in well manured sandy loamy soil.
...	Rows 1½ ft. apart, plants 1 ft. apart.	3 months after sowing seeds.	...
...	Broadcasted in bed 3 ft. by 3 ft.	1 month after sowing seeds.	These can be grown throughout the year.
...	Rows 1½ ft. apart, plants 1 ft. apart,	4 months after sowing seeds	Trained on pendal.
...	Rows 1½ ft. apart and plants 1 ft. apart.	3 to 4 months after sowing seeds,	The crop should be harvested before the fibre develops in the fruits.
...	Pits 15 ft. apart, 3 seeds in a pit at 1 ft. apart.	4 to 5 months after sowing seeds,	Trained on pendal.
...	Pit 10 ft. apart, 4 seeds in a pit at 1 ft. apart,	4 months after sowing seeds.	The pits should be manured with farm yard manure and ashes.
...	Rows 2 ft. apart	4 to 6 months after sowing seeds,	Propagated by vine cutting measur- ing 8" to 10" long. The vines should be periodically pruned to prevent the formation of small unmarketable tubers at every node.

Notes on flower Gardening

The climate of the State is suitable for the cultivation of tropical, subtropical and temperate plants, and by a careful selection of plants it is possible to have a garden in flower throughout the year. The chief requirements of a good garden are a well drained loamy soil, a good supply of water which should be free from alkalinity and protection from wind and mechanical damage for which a compound wall or a good hedge such as of *Clerodendron inerme*, *Bougainvillea*, or *Duranta* will serve the purpose.

The best time for commencing garden operations is when the southwest monsoon starts which is generally at the beginning of June. Much time and money will be saved by making a plan of the garden before laying it out. Usually, the ornamental portion of the garden is located in front of the house and the fruit and kitchen garden behind the building. To start with, drains should be constructed to take away the storm water; otherwise, damage will be caused to the plants during heavy rains by stagnation of water, and then the roads and foot-paths should be formed and consolidated with laterite and gravel. The land should be trenched or deeply dug and enriched by the application of well-rotten farmyard manure. If necessary, red earth and sand should be added.

The ornamental garden usually consists of the following divisions—(1) Trees, (2) Lawns, (3) Shrubberies, (4) Flower-beds, (5) Rockeries, (6) Rosary, (7) Shade garden, (8) Pot garden, (9) Plant house, (10) Orchid house, (11) Water garden, and (12) Nursery (Fruit and Vegetable gardens are dealt with separately.)

TREES.—Trees are permanent features of a garden. They are of two kinds, namely, deciduous and evergreen. The deciduous trees shed their leaves generally in the winter and develop their floral display when devoid of leaves while the evergreen ones are in their fully glory of foliage and blossom simultaneously. They are planted as single specimens or in clumps on lawns or in open-areas of the garden as ornamental specimens for colour effect, as objects of scientific interest or to provide shade and to serve as wind-breaks. Mistakes committed in their planting cannot afterwards be easily rectified.

LAWNS.—A lawn could be made by sowing seeds or planting roots of *Hariali* grass (*Cynodon dactylon*) during rains and constantly weeding, mowing, rolling and manuring. But the best method of making a lawn is to prepare the ground and plaster it with a mixture of red soil cowdung and *Hariali* roots chopped to bits.

The lawn should be furnished with flower-beds, shrubs, and ornamental trees in suitable places and edged with edging bricks or iron bands.

SHRUBBERIES.—These are usually planted against compound walls. The tall plants are mostly put in at the back and dwarf ones in front. The most important point is the arrangement of plants according to their colours. Shrubberies should be manured at least once a year before the rains and all deciduous shrubs should be pruned to proper height and shape in the hot weather just before the rains when they are not very active. Care should be taken not to clip the plants flat.

FLOWER-BEDS.—Flower-beds are formed in different shapes and sizes which should be determined by their position and the extent of the ground. In the case of formal gardens the beds are formed along roads or foot-paths leaving a border of 2 or 3 feet. Large flower plants such as Cannas and Dahlias require bigger beds than those of annuals like Asters, Pinks, Phlox, etc. The monotony of long flower-beds is broken by the use of Roses or clipped plants such as

bougainvillea, Cypress, etc. The beds are sometimes edged with iron bands to keep their shape and sometimes with edging plants such as *Alternanthera*.

ROCKERIES.—Rockeries usually require to be protected against severe sun here. They may be located under the shade of evergreen trees. A good compost should be filled in the pockets among the stone to grow plants in. The main thing in making a rockery is to see that the stones are not laid in straight lines and too artificial a manner, and that sufficient room is allowed for plants in among the rocks.

ROSARY.—The rose garden may be made with plants growing either in the ground or in pots. When planted in the ground they should be away from large trees whose roots and shade seriously affect the growth of the plants. The arrangement of standards and bushes should be studied as also the colours while planting in beds. Arches at entrances and where foot-paths meet, may be furnished with climbing varieties. Rose plants in ground are generally pruned and manured twice a year in June and October; pot plants are pruned and manured from 40—60 days before blooms are expected, according to the varieties.

SHADE GARDEN.—A shade garden which is very useful in the hot weather could easily be made by planting foliage plants like *Marantas*, *Heliconias*, etc., in bed, under the shade of a clump of trees. The beds, however require constant attention on account of the interference of the roots of trees.

POT GARDEN.—Many annuals, perennials and foliage plants could be grown well in pots. These are particularly useful in verandahs and on steps. The chief advantage is that they can be moved about and also that they may be given special attention. Plants have to be grown in any case in pots when they are meant to be exhibited at the shows.

It is desirable that a heap of general compost is always kept ready. It is made by putting layers of $1\frac{1}{2}$ parts of sand, 3 of leaf mould, 2 of red earth and $1\frac{1}{2}$ of horse manure in successive turns and keeping the heap in a moist condition. Different kinds of plants require different composts.

PLANT HOUSE.—Plant house requires protection from sun and wind. An enclosure built of stone pillars with wooden trellis between them and wire-net roof will serve the purpose. Any quick growing creeper, preferably *Bignonia gracilis*, may be grown to cover the roof and the sides. By judiciously pruning the creeper, the required amount of light may be regulated in the plant house. Till the creeper grows up the roof may be covered with coir matting of an open texture and the side with bamboo *thatties* or plaited coconut leaves. In a plant house it is usual to include ferns and other foliage plants such as Palms; *Dracaenas*, *Alocasias*, *Anthuriums*, etc. The plants have to be syringed with water especially during the dry seasons. The beauty of the fernery or plant house depends much on the arrangement of the foliage plants in it.

ORCHID HOUSE.—An orchid house is best built with large glass windows and glass roof. Most of the indigenous orchids require plenty of light and heat. Drainage is very important. Some orchids have to be grown in special perforated pots or in teakwood or wire baskets. Epiphytic orchids may be tied on to evergreen trees, with their roots covered with moss. The air around the plants should be kept moist by constant syringing with water. During the resting period, over-watering should be avoided.

WATER GARDEN.—This is useful for growing beautiful water plants such as Lotus, Water-lily, etc., but the difficulty here is to find water to grow plants in. A natural pond would be admirably suited for this purpose; a few plants could however be grown in baskets kept in small cisterns particularly in a fountain basin.

GARDEN EMBELLISHMENT.—Gardens may be embellished with ornamental parapet walls, steps, fountains, seats, pergolas, bowers, bird baths, sun-dials, etc., the nature and extent of the use of which depends on the scope of the ground and the amount of money that the owner is prepared to spend on his garden.

NURSERY.—There is another part of the garden which is very important though it cannot strictly be said to be a part of the garden proper. What the kitchen is to the house, the nursery is to the garden. The nursery should be located in a convenient but secluded place, as otherwise it is sure to detract from the beauty of the garden. It is convenient if it is under shade which may be had by planting quick growing trees such as the Rain tree (*Pithecolobium saman*). Shade is useful to keep potted plants till they are established and are fit for being kept in the garden. A shed for keeping bulbs, seeds, tools, etc., is a necessity, as also an open shed for working in rainy weather and for keeping small seedlings protected against wind and rain. Manure and leaf-mould pits may be situated nearby.

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PART I—FLOWERS.

* Perennial. † Bulb. The rest are Annuals.

Serial No.	Name	Colour	Sowing Season	Flowering Season	Soil & Mixture	Direction	Remarks
1	Ageratum	Blue and white	April-May	Aug.-Sept	1	To be sown in carefully sifted sandy soil and transplanted when seedlings are 2 inches high.	It may be grown throughout the year. Suited for beds, borders and pots.
2	* Anemone	Different colours	April ...	August ...	3	Propagated by seeds and tubers ...	Flowers only in this season. Suited only for rockery and pots
3	Antirrhinum.	Various colours	September	February	1	To be sown in carefully sifted sandy soils in pans or boxes, protected from sun and rain.	It can be grown throughout the year though it does better in early summer. Suited for borders, beds and pots.
4	Aster	Various colours	Do ...	Do ...	1	Do	Do
5	Brachycome.	Blue, pink and white	February	August ...	1	Do	Flowers only this season. Suited for borders and pots.
6	Calceolaria	Do	Do ...	Do	...	Do	It does not thrive here.

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Serial No.	Name	Colour	Sowing Season	Flowering Season	Soil Mix- ture No.	Direction	Remarks
7	Calliopsis	Golden yellow.	October...	March ...	1	To be sown in carefully sifted sandy soil.	It can be grown throughout the year. Suited for beds and borders.
8	Campanula	Ble and white.	September	August ...	1	Do	Flowers only in this season. Suited for borders and pots.
9	Candytuft	White ...	April ...	Do	1	May be sown in beds and thinned.	It can be grown throughout the year. Suited for beds and borders
10	Carnation	Various colours.	November	February	2	To be sown in carefully sifted soil in pans or boxes. They are also propagated by layering and cuttings.	It can be grown throughout the year. Suited for pots particularly.
11	Chrysanthemum	Various Colours	February	August ...	2	Propagated by seeds, cuttings and suckers.	Flowers well in this season. Suited for beds and pots.
12	Cineraria...	Do ...	Dec. Feb.	Do ...	2	To be sown in carefully sifted soil in pans or boxes. The seedlings should be potted gradually into pots of larger size.	...

13	Clarkia...	Pink and white	March ...	Do ...	1	...	Do	It does not thrive here.
14	Chianthus	...	...	Do ...	...	...	...	It can be grown throughout the year. Suited for banks, screen boxes, poles hanging baskets and vases.
15	Convolvulus	Various colours	May-June	Aug.-Sept	1	...	...	It can be grown easily throughout the year. Suited for beds.
16	Cosmos...	Do ...	Do ...	Do ...	1	May be sown directly in the ground.	...	Flowers only in this season. Suited for only pots.
17	Cyclamen	Do ...	Nov.-Dec.	July-Aug.	3	Grown by seeds and cuttings.	...	Flowers in these seasons. Suited for pots, beds and borders.
18	Dahlia ...	Several colours.	March-Apr	July-Aug. June.	3	Propagated by seeds and cuttings.	...	Flowers throughout the year. Suited for beds, borders and pots.
19	Delphinium (Larkspur)	Pale and pink.	May-June	July-Aug.	1	Propagated by seeds and roots.	...	It does not thrive here.
20	Fischscholtzia	Various colours.	October...	January...	...	...	...	It can be grown easily throughout the year. Suited for beds and borders
21	Gaillardia	Red, orange and yellow	May-June	Aug.-Oct.	1	Propagated by seeds.	...	

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Serial No.	Name	Colour	Sowing Season	Flowering Season	Soil Mix- ture No.	Direction	Remarks
22	Gerbeaa	Various colours.	Feb.-March	Nov.-Jan.	2	Propagated by seeds and divisions.	It can be grown easily throughout the year. Suited for beds and borders.
23	Gladiolus	Do	June-July	Aug.-Sept.	3	Propagated by seeds and corns.	It can be grown only in this season. Suited for beds, borders and pots.
24	Gloxinia	Do	April-May	Do	2	Grown by seeds, leaf cuttings and tubers.	It can be grown only in this season. Suited for pots only.
25	Godetia...	Do	Oct.-Nov.	Feb.-March	1	To be sown in carefully sifted soil.	Do
26	Heliotrope	Bule, pink and white.	March-Aprl.	Aug.-Sep.	2	May be grown from seeds and cuttings,	It can be grown throughout the year. Suited for borders and pots.
27	Impatiens	Various colours.	April-May	Do	...	Do	It can be grown throughout the year. Suited for pots and rockery.
28	Lobelia...	White, blue and pink.	Oct.-Nov.	Jan.-March	1	From seeds	Flowers in this season only. Suited for beds, borders, pots and rockery.

29	Lupines...	Various colours	March-Apr.	Aug.-Sept.	1	From seeds	...	Flowers in this season only. Suited for borders and pots.
30	Marigold	Yellow and yellowish red.	Do	Do	1	Do	...	It can be grown throughout the year. Suited for beds and borders.
31	Maurandia	Pink mauve and white.	Do	Do	1	Do	...	It can be grown throughout the year. Suited for screen boxes.
32	Mignonette	Golden yellow.	April-May	Do	1	Do	...	Flowers only in this season. Suited for pots.
33	Nasturtium	Various colours.	Do	Do	1	May be planted directly in beds.		It can be grown throughout the year. Suited for beds, pots and rockery.
34	Nicotiana	Various colours.	April-May	Aug.-Sept.	1	To be sown in carefully sifted soil.		It can be grown throughout the year. Suited for beds, pots and borders.
35	* Pessiflora	Blue, scarlet and white.	May-June (Potting)	Oct.-Dec.	15	Grown by layering and cuttings.		It can be grown throughout the year. Suited for trellis and arches.
36	Phlox ...	Various colours.	March-Apr.	Aug.-Sept.	1	To be sown in carefully sifted sandy soil.		It can be grown throughout the year. Suited for beds and pots.

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Serial No.	Name	Colour	Sowing Season	Flowering Season	Soil Mix	Direction	Remarks
37	Petunia...	Various colours	Mach.-Apl.	Aug.-Sept.	1	To be sown in carefully sifted soil, also grown by cuttings.	It can be grown throughout the year. Suited for pots and beds.
38	Pinks ...	Do	Do	Do	1	Do	Do
39	Poppy ...	Do	Do	Do	1	To be sown in carefully sifted soil.	Thrives only in this season. Suited on beds and pots.
40	Portulaca	Do	Sept.-Nov.	Jan.-Feb.	1	Do	Thrives only in this season. Suited for pots and rockery.
41	Primula	Do	Mar.-May	Aug.-Oct	2	Do	Do
42	Salvia ...	Red, blue, white and pink.	May-June	July-Aug.	2	Do	It can be grown throughout the year. Suited for borders, pots and beds.
43	Scabiosa	Various colours.	April-May	Dec.-Feb.	1	To be sown in carefully sifted soil.	Thrives well in this season. Suited for beds only.
44	Stocks ...	Do ...	Sept.-Oct.	Feb.-Mar.	1	Do	Thrives well in this season. Suited for pots only.
45	Sunflower	Yellow ...	Nov.-June	Feb.-Aug.	1	Do	It can be grown easily throughout the year. Suited for beds and borders.

46	Sweet- Peas	Various colours.	May-June	July-Sept.	1	If grown in beds deep digging should be done.	Thrives well only in this season. Suited for pots.
47	Sweet- William	Do ...	Do	Do	1	To be sown in carefully sifted soil.	It is grown only in this season. Suited for beds and pots.
48	Vila ...	Do ...	April-May	Aug-Sept.	1	Do	Thrives only in this season. Suited for pots.
49	Zinnia ...	Do ...	May-June	Aug-Oct.		Do	It can be grown easily throughout the year. Suited for beds and borderets.

NOTE.—(i) The sowing season mentioned in the guide holds only for Bangalore and places with similar climate in South India.
For plains and hills, the time for sowing varies. Generally October is the best month for sowing in the plains
and March on the hills.

(ii) For soil mixture see page 54 and 55.

The Cultivation of Russian Sunflower (*Helianthus annuus*, Linn).

Russian Sunflower can be grown either as a dry or garden crop. The plants grow to a height of 7' to 8' with flowers 2' to 2½' in circumference 1' to 1½' in diameter and are full of seeds.

In the younger stage, the plants serve as a good feed for cattle and for ensilage. A valuable oil is obtained from the seeds. The oil is edible and also used in medicine, scents, soap making and other industrial purposes. The seeds also form a valuable poultry food. The whole plant is rich in potash.

Preparatory Cultivation:—

For dry crop.—The land should be ploughed well twice or thrice and spread over with farmyard or other manure at 10 cart-loads per acre.

For Garden crop.—The land should be well dug up, the plot levelled and furrows made at 2 feet apart.

Sowing.—Seeds should be sown broadcast for dry crop in rainy season, and in case of garden crop seeds should be sown at 9" to 1' apart in furrows 2 feet apart. About 12 to 20 lbs. of seeds for dry crop and 8 to 10 lbs. of seeds for garden crop are required for sowing an acre.

Irrigation.—The crop should be irrigated once a week only in case of garden crop.

After cultivation.—The plot should be kept free from weeds and the plants earthed up when they are a foot high.

Harvesting.—The crop will be ready for harvesting in about 3 to 3½ months from the date of sowing the seeds. Flower heads are cut when dry, seeds easily separated by hand, collected, dried and graded.

Yield.—2,000 to 4,000 lbs. of seeds may be obtained from an acre. About 10 to 20 per cent of the seeds are hollow without kernels probably due to defective pollination by insects.

Australian Salt Bush (*Atriplex nummularia*, Linn).

Salt Bush is a small shrub growing to a height of about four feet. It is largely used as a pasture for cattle and sheep in dry regions of Australia. It withstands great amount of heat and alkalinity in the soil. It is also used for reclaiming alkaline soils.

Seed rate is from 8 to 10 lbs. per acre.

The land should be tilled or dug thoroughly and manured. A day previous to the sowing of seeds slight irrigation is desirable for evenly stirring the soil. When this is completed and the land brought into a mellow condition, furrows are to be opened out a foot-and-a-half apart as also cross channels for every ten feet, if the crop is to be raised under irrigation.

On the brim along the furrows, a straight line should be drawn and seeds sown lightly at one foot in a line and lightly covered with soil and irrigated. It takes ten to fifteen days to germinate. When plants put forth four to six leaves, earthing is to be done and the land should be irrigated once in three days in the absence of rains. One to one-and-a-half months after earthing up, the plants blossom when they are fit for feeding stock. The plant matures in three months.

It is very wholesome and fattening. The stock pastured on Salt Bush are said to remain not only free from fluke but recover from *Distoma* and other allied ailments. It is an excellent food for stock which, when they are fed on this, require no salting.

Salt Bush can be grown on all soils and can be successfully cultivated in arid and alkaline soils.

Rhodes Grass: Sweet Grass.

CHLORIS GAYANA S. W.

Rhodes grass is a superior kind of fodder which is very nutritious. It is readily eaten by all kinds of stock. It was first introduced by this department 35 years ago from Australia. This grass is largely in cultivation in most of the local gardens and grass farms in and outside the State. In good soil and under proper cultivation, this grass grows to a height of two-and-a-half to three feet. The growth of this grass is greatly checked during heavy rains and dewy seasons when the grass becomes yellow. It can be grown as a dry or irrigated crop.

SOIL.—Any kind of well-drained soil is suitable for the cultivation of the grass.

MANURE.—Farmyard manure, horse manure, sewage silt or other suitable manure may be used.

PREPARATORY CULTIVATION.—The soil should be dug well or ploughed and levelled and then enriched with manure to the extent of about 15 to 20 cart-loads per acre.

SOWING.—This crop can be grown by sowing seeds as well as by planting roots. Seeds should be sown thinly in furrows one and half feet apart and seedlings thinned out to 1 foot apart when they are about 6" to 9" high. About 5 lbs. of seeds are required to sow an acre. If roots are used they should be planted 1 foot apart in furrows, one-and-a-half feet apart. About 12,000 to 14,000 roots are required to plant an acre. This can also be grown as a dry crop by broadcasting seeds in the rainy season when about 6 to 8 lbs. of seeds are required to sow an acre. It is advisable to plant suckers to get earlier yield.

IRRIGATION.—This crop should be irrigated at least once a week in the absence of rains.

AFTER CULTIVATION.—The plot should be kept free of weeds, and the soil raked and earthed up after each cutting. In the second year, the suckers should be thinned out while raking and earthing up to prevent stunted growth of the grass. The crop may be kept on for about 10 years if the operations of cultivation are well attended to, though it is advisable to re-plant the grass in new plots after the fifth year.

HARVESTING.—The first cutting takes about two to two-and-a-half months from the date of sowing seeds and about one-and-a-half months from the date of planting suckers. The grass is fit for harvesting when it is in flower.

COST OF CULTIVATION.—The cost of cultivation is about Rs. 150 per acre per year.

YIELD.—The annual yield per acre is about 50,000 to 80,000 lbs. with six to eight cuttings which will fetch an income of Rs. 250 to Rs. 400 if the grass is sold at 8 annas per 100 lbs.

Cultivation of Potato (*Solanum Tuberosum* Linn).

INTRODUCTION.—The potato belongs to the solanum family which includes about 700 distinct species of which a few are tuberous. It is a native of South America from where it has spread all over the world. It is a very nutritious and much valued "protective" food.

The most suitable soil is a deep sandy loam containing lime. Perfect drainage in the soil is essential for this crop. Light or gravelly soils are as bad as wet and heavy ones. The potato is propagated by means of "sets" (divided tubers with two or more eyes) or whole tubers for planting on a large scale.

In Mysore State, potato is mainly grown as in irrigated crop in the taluks of Devanahalli, Hoskote and Bangalore in Bangalore District and in the taluks of Sidlaghatta, Malur, Chickballapur and Kolar in Kolar District. (In Hassan District, it is grown to a small extent as a rainfed crop). Potato thrives well in places getting an average rainfall of 30 to 40 inches.

Two crops of potato are raised in a year, the summer crop is grown from May to June, and the winter crop from October to December. Better results have been obtained by growing this crop during the winter season as potato prefers a cool climate.

The varieties grown mainly are Rickets and Italian White Round (Dharwar) and to a small extent Mountain. The Italian variety is generally used for the winter planting, while the other two varieties are grown in both the seasons. Besides about 40 imported varieties of potatoes such as Great Scot, Arran Comrade, etc., are cultivated for experimental purposes.

PREPARATORY CULTIVATION.—The land is trenched to a depth of about $1\frac{1}{2}$ ' and exposed for a fortnight so that insect pests and weeds are destroyed. The clods are then crushed and the land levelled and made into plots 30' wide. Before the second digging is done, the land is sprinkled with water if it is dry from temporary shallow water channels made for the purpose. About 30 cart-loads of well rotten farm-yard manure is spread evenly and mixed well by lightly digging it in the soil.

Main irrigation channels along the bunds of the plots and planting furrows 2 inches deep and $1\frac{1}{2}$ ' apart parallel to the main irrigation channels are made. Subsidiary irrigation channels about 4 to 5 feet apart at the right angles to the main irrigation channels are then made.

PLANTING.—The seed potatoes which weigh about 2 or 3 ozs. each and which are free from diseases are selected for planting. They generally contain 4 to 6 buds in each tuber. The buds should be just sprouting. Such tubers are cut into sets containing at least two buds each. The sets are then dipped in air slaked lime dust and kept for a day or two in sand in a room in order that the cut surfaces may heal. The sets are then planted 9 inches apart and $1\frac{1}{2}$ inches deep as the bottom of the furrows by removing a little soil and covering the set with soil again. After planting is over, the furrows are made smooth for irrigation.

The seed rate is 900 lbs. per acre.

IRRIGATION.—The plot is irrigated a day after planting the potato sets and after that irrigation is done so as to keep the soil slightly moist till the shoots appear above ground. The irrigation is done once in 3 or 4 days in dry weather. The potato plot should not be kept either too dry or too wet.

AFTER CULTIVATION.—The first weeding is done a month after planting. The second weeding is done when the rows of plants are earthed up, about two weeks later when the plants are 4 inches high. If weeds come up again they are removed. As far as possible, the potato field is kept free from weeds.

Soon after earthing up, the plants are sprayed with Bordeaux mixture as a preventive against disease. *Epilachna* beetles, their larvæ and eggs are constantly hand-picked and destroyed.

PESTS.—*Epilachna* beetles as well as larvæ eat away the tissue of the leaves and cause considerable damage to the crop. The beetles, the larvæ and the eggs are constantly hand-picked and destroyed. If the attack is heavy, lead arsenate solution is sprayed which controls the pest.

STEM BORERS.—Caterpillars bore into the stem and cause the plant to wilt. The wilted portion is cut open and the caterpillar is removed and destroyed.

PLANT LICE.—These attack tender shoots of the plants. Hongey oil soap (1 lb. in 8 gallons of water) is sprayed at an interval of a fortnight to control them.

DISEASES.—Potato Blight (*Phytophthora infestans*). This disease causes heavy loss and when once settled in the soil, it is difficult to eradicate. As soon as this disease appears, which is easily recognised by the formation of dark patches and whitish bloom on both the surfaces of the leaves, the plants are thoroughly sprayed with Bordeaux mixture, care being taken to wet the under surface of the leaves with a Holder Sprayer. As a preventive against blight, the plants are sprayed with Bordeaux mixture soon after they are earthed up.

RING DISEASE OR BACTERIAL WILT.—(*Bacillus solanacearum*). The symptoms of this disease are the sudden wilting of the plant, the leaves hanging flaccid as if the stalk had been cut through, and later the plant dying down. When the tubers of the infected plants are cut through, a brown ring is noticed. The diseased plants are uprooted and burnt and the ground is dug up and exposed to sun. Affected tubers are not used for planting.

HARVESTING.—The potato crop is dug when the leaves begin to turn yellow, usually 3 months after planting in the case of Rickets, and four months in that Dharwar potato. In the cold weather, the crop takes about two weeks longer. At this stage water is withheld. Tubers are dug out by means of "guddalies" (hoes), and removed to the barn where they are kept for about a week spread evenly on the floor.

YIELD.—An average yield is about ten times the seed rate, the out-turn being about 9,000 lbs. per acre or 10 cart-loads. The value of this at Rs. 60 per cart-load amounts to Rs. 600. The cost of cultivation amounts to Rs. 250 per acre, yielding a net profit of Rs. 350 per acre.

Cultivation of Papaya

CARICA PAPAYA—LINN

The papaya is one of the quickest growing plants. It needs a good, rich, loamy soil, with a liberal amount of well rotten manure. The pits for planting should be three feet cube at least. If the soil is of a clayey and retentive nature, a layer of broken bricks or pot shreds should be at the bottom of the pits. Though papaya is fond of moisture, the land must be well drained. If the soil becomes waterlogged the trees will turn yellow and fail to fruit. The best time to prepare the pits for the young plants is during the hot season. The soil should be allowed to remain on the surface for two or three weeks exposed to the sun and air. Just before the Monsoon, the pit must be filled with soil and manure. After a few heavy showers, when the pits are settled down, the planting should be done. Care should be taken that the plants are not set too deep in the pits. If the collar (the point where the trunk and the root meet) be buried, there is a chance of this portion decaying and the plant dying. The distance between the plants may be 10 to 12 feet. This will give the trees room to grow freely and will allow free play of sun and air.

Watering must be done regularly during dry weather, and also when the plant begins to flower. Two basketfuls of well rotten farm yard manure should be applied before the monsoon every year.

The tree begins to fruit when about 10 months old. Too many fruits must not be allowed to develop at first. When the first few fruits have set, the strongest and the best shaped ones should be kept, and all others should be nipped off. The young vigorous tree will endeavour to produce far more fruits than it can properly carry to maturity. After the second year, when it

is much stronger and larger, more fruits may be left on. The tendency of the papaya is to produce too many fruits, and thinning out a number of them will result in better and finer fruits. If well attended to, the trees will continue to bear fruits almost all the year round for several years.

Planted at the distance mentioned above it may be reckoned that about 400 trees will suffice to plant up one acre of land.

Hints for the treatment of plants after they reach their destination

1. The parcel must be opened as soon as it is received and the plants taken out carefully. The damaged and dried branches should be pruned back to healthy portion and to an outer bud. Similarly the roots should also be pruned after cleaning them free of packing materials, such as moss, etc. The roots should be dipped in clay solution and the plants should then be kept in sand in a cool shady place and watered carefully.

2. The plants must be potted or planted in ground as soon as they show signs of growth.

3. The potted plants should be kept in shade till they are established and the plants in ground should be shaded from sun and protected from mechanical damage.

4. The plants must not be over-watered.

DRIAGE IN CROPS AND RELATED INFORMATION

GROUNDNUT

Four thousand lbs. of green nuts dried to 2,600 lbs. dry nuts (Visvesvaraya Canal Farm). Eighty-four lbs. of pods yield 28 lbs. seed and the seed yields 40 per cent oil and 60 per cent cake (Chitaldrug Circle). 35.8 lbs. pods yield 10.3 lbs. seed (Babbur Farm).

SUGARCANE

Sugarcane has given the following ratios—

	<i>Visvesvaraya Canal Farm</i>	<i>Babbur Farm</i>
Weight of cane	... One ton	One ton
Weight of juice	... 1,340 lbs.	1,138 lbs.
Weight of jaggery	... 252 lbs.	230 lbs.
Weight of clean jaggery	... 241 lbs.	...
Weight of sugar	... 210 lbs.	...

TOBACCO

Twenty thousand lbs. green leaf yield 3,095 lbs. cured (Visvesvaraya Canal Farm).

COTTON

Variety of cotton. *Lint with seed.* *Ginned lint.* *Seed obtained.*

VISVESVARAYA CANAL FARM

		Cwt.	lbs.	lbs.
M. A. 2	...	1	34.5	75
X. 4383	...	1	38.6	10.2
X. 3915	...	1	36.4	72.5
Co. 1267	...	1	39.9	70.2

CHITALDRUG CIRCLE

		lbs.	lbs.	lbs.
Doddahatti	...	25	8	18
				2 dust.
Sannahatti	...	28	7	19
				2 dust.

BABBUR FARM

		lbs.	lbs.	lbs.
Doddahatti	...	100	32'5	67'5
Sannahatti	...	100	28'6	71'4

PADDY

MALNAD

Variety of paddy.		Whole grain green.	Whole grain dry.		Rice to paddy.
	Seers	lbs.	Seers	lbs.	By weight By volume
					per cent
S. 651	...	100	189	94	178 ... 55½
G.E.B. 24	...	100	190	94	180 ... 53
S. 139	...	100	192	94	100 ... 54½
T. 129	...	100	198	95	190 ... 60
W. 3629	...	100	161	95	182 ... 48
HO. 529	...	100	193	96	184 ... 50

BABBUR FARM

Seers.	lbs.	Seers.	lbs.	By weight	By volume*
					per cent.
...	100	...	84½	...	...

NAGENAHALLY FARM

	Straw green weight	Straw dry weight
	lbs.	lbs.
X. 324	...	100
X. 536	...	100
S. 197 (Alur Sanna)	...	100
S. 199 Do	...	100
S. 268 (Gunasale)	...	100
S. 328 Banku	...	100
S. 399 Halubbalu 3 months	...	100
S. 547 Chintamani Sanna	...	100
S. 298 Halubbalu	...	100
S. Halubbalu 3 months	...	100

CHILLIES

Fourteen and half lbs. green reduced to 4½ lbs. dry (Malnad).

ARECANUT

Five hundred and eighty-five lbs. nuts with shells yield 263 lbs. shelled which in turn yield 81½ lbs. cured nuts (Malnad).

Cardamom and Coffee (Chikmagalur Circle).

CARDAMOM.

Saklespur Variety (For 100 fruits)		Cowcody Variety (For 100 fruits)
Green weight grams.	Dry weight grams.	Green weight grams.
78'4	16'8	88'1
		Dry weight grams.
		17'3

COFFEE

Ripe cherry to dry cherry—			
Ripe cherry		Dry cherry	
100 lbs.	...	34'92 lbs.	
100 bushels	...	52'62 bushels.	
Dry cherry to clean coffee—			
100 lbs. of dry cherry	...	55'87 lbs.	
		clean coffee.	
100 bushels „	...	33'15 bushels.	
Ripe cherry to clean coffee—			
100 lbs. of ripe cherry	...	19'25 lbs.	
		clean coffee.	
100 bushels „	...	17'50 bushels.	
Green to wet parchment—			
100 lbs. of fruits	...	38'3 lbs.	
		wet parchment.	
100 bushels „		34'35 bushels.	
Wet parchment to dry parchment—			
100 lbs. of wet parchment	...	52'50 lbs.	
		dry parchment.	
100 bushels „	...	90'7 bushels.	
Ripe cherry to dry parchment—			
100 lbs. of fruits	...	19'95	
		dry parchment.	
100 bushels „	...	32'20 bushels.	
Dry parchment to clean coffee—			
100 lbs. dry parchment	...	84'27 lbs.	
		clean coffee.	
100 bushels „	...	49'5 to 51.4 bushels.	

N.B.—One Imperial struck bushel=28 struck seers.

VOLUME—WEIGHT OF CERTAIN CROPS

<i>Produce</i>	<i>100 Mysore seers weigh</i>
	lbs.
Ragi H. 22	205
„ Dharani	209
„ K. I.	209
„ E. S. 11	211
Paddy	187.5
Jola Bili	225
„ Sorghum 2	233
„ Maldand	233
„ N. T.	233
„ Striga resistant	228
„ Orgaru	218

la Mungar Yellow	...	...	218
" Kaki	...	...	212
ajra (<i>Penisetum typhoideum</i>)	...	...	200
avane (<i>Setaria italica</i>)	...	...	207'7
vare (<i>Dolichos lablab</i>)	...	...	243'8
ogari (<i>Cajanus indicus</i>)	...	...	210.8
oyabean	...	...	210
orsegram (<i>Dolichos biflorus</i>)	...	...	262.5
roundnut pods H. G. 1	...	...	91
" Spanish	...	...	100
" Valencia	...	...	75
" Average	...	...	86
" Seeds average	...	...	193'8
besamum	...	...	203'5
Castor	...	...	162'5

NOTES ON MANURING FOR THE PRINCIPAL CROPS IN MYSORE

The manurial programme indicated in the following paragraphs is only advisable under normal soil and climatological conditions.

In case of doubt and in abnormal cases and for manurial treatment of other crops, it is desired that the Chemical Section of the Department or the nearest Agricultural Officer be consulted for necessary inspection and suitable recommendations.

I. SUGARCANE.

1. Plough in 6 to 10 cart-loads of green manure per acre not earlier than 20 days and not later than 25 days before planting. It would be an advantage if the green manure crop is grown *in situ*: a mixture of sunnhemp and cowpea would suit the purpose.

2. A fortnight later, i.e., five to seven days before planting, spread evenly not less than 20 cart-loads of farmyard manure per acre and mix thoroughly with soil by shallow ploughing or passing the cultivator. In case of pit planting, apply at least four to five baskets of cattle manure to each pit.

3. Apply at planting a mixture of 2 cwts. of sulphate of ammonia, $\frac{1}{2}$ cwts. of concentrated supers and 1 cwt. of sulphate of potash per acre in the newly opened up furrows or pits and cover the mixture with a thin layer of soil. Irrigate lightly and plant cane setts taking care that the eye buds do not come in direct contact with the fertilizer mixture (sulphate of potash may be omitted where cane is grown only occasionally).

4. Earth up the young crop lightly six weeks after planting after applying if available, 5 tons of compost or half a ton of cake mixture.

5. Apply 1 cwt. of sulphate of ammonia twelve weeks from planting.

6. Thirteen to fourteen weeks from planting, earth up the crop finally after applying three tons of compost if available or half a ton of groundnut cake or mixture of oil cakes.

The whole of the farmyard manure may be advantageously replaced by compost, compost to farmyard manure being in the proportion 1 : 3.

Other conditions being normal, about 350-400 maunds of jaggery or a cane crop of 35-40 tons per acre may be reasonably expected.

II. PADDY.

1. Plough in 5 to 10 cart-loads of green manure per acre 7 to 10 days before sowing or transplanting.

2. Spread evenly 5 to 10 cart-loads of farmyard manure or 2 to 4 cart-loads of compost per acre three days before sowing or transplanting and mix thoroughly with soil by shallow ploughing or puddling.

3. Broadcast a mixture of 1 cwt. of groundnut oil cake, 56 lbs. of sulphate of ammonia and 56 lbs. of supers or bonemeal, just before sowing or transplanting.

The sulphate of ammonia can well be replaced by 1 cwt. of groundnut cake and the amount of supers reduced wherever a rich compost is used.

It is essential to control the flow of water to and from the paddy plot for at least a fortnight after planting so that the wash and loss of manures from terrace to terrace and finally into the drain is kept at a practicable minimum.

III. TOBACCO.

1. *Field*:—Plough in thoroughly 1 to 4 cart-loads of compost per acre 2 weeks before transplanting and apply evenly in the newly opened up furrows 3 to 5 days before transplanting, 390 lbs. per acre of a mixture of 100 lbs. of groundnut cake; 80 lbs. of sulphate of ammonia; 150 lbs. of concentrated supers and 60 lbs. of sulphate of potash. Cover lightly with soil and transplant carefully avoiding direct contact of roots with fertilizers.

IV. COTTON.

Plough in thoroughly 4 cart-loads of farmyard manure 10 to 15 days before sowing or 2 cart-loads of compost per acre 3 to 5 days before sowing. Thereafter one of the following practices may be adopted.

1. Apply in the newly opened up furrows 2 and 3 days before sowing, 350 lbs. per acre of a mixture of 200 lbs. of castor oil cake; 40 lbs. of sulphate of ammonia; 50 lbs. of concentrated supers and 60 lbs. of an equal mixture of sulphate and chloride of potash. Cover thinly with soil and sow seed after lightly irrigating the furrows.

2. No manure is applied at the time of sowing but when the crop is about 4 to 5 weeks old, apply to plants groundnut oil cake powder at the rate of 3 to 5 cwts. per acre or 10 cwts. of castor seed per acre and afterwards lightly earth up the plants.

V. GROUNDNUT

Plough in 2 cart-loads of compost per acre 10 to 15 days before sowing and apply just before sowing 90 lbs. per acre of mixture of 20 lbs. of sulphate of ammonia, 50 lbs. of concentrated supers and 20 lbs. sulphate of potash.

VI. RAGI.

Plough in 4 cart-loads of farmyard manure or 2 cart-loads of compost per acre 2 to 3 weeks before sowing or transplanting.

In the case of irrigated ragi, apply further a mixture of 2 cwts. of groundnut cake and 56 lbs. of supers or bonemeal, either at transplanting or at the first weeding.

Applying artificial fertilizers to dry ragi is not advisable unless the seasonal conditions are exceptionally good and rains are up to expectation.

VII. JOLA.

Plough in 4 cart-loads at least of farmyard manure or 2 cart-loads of compost per acre 2 to 3 weeks before sowing and where irrigation facilities are available or rains are assured, apply before sowing, a mixture of 84 lbs. of groundnut cake, and 56 lbs. supers or bonemeal per acre.

VIII. COCOANUT.

Early in September each year, dig a circular trench 9" deep and 2 feet from the base of the palm and fill into the trench a mixture of:—

- 50 lbs. of compost,
- 1 lb. of bonemeal,
- 1 lb. of concentrated supers,
- 2 lbs. of muriate of potash,
- 1 lb. of common salt,

over the manure with the excavated earth give a light watering for a few days thereafter.

Fish meal can well be used in place of compost or bonemeal.

This mixture has to be applied every year and is therefore advisable for commercial plantations only.

For the ordinary household palms and others of like kind, the following mixture may be applied once a year in the manner described above.

Three baskets of compost or 5 baskets of farmyard manure and a mixture of 2 lbs. of kainit and 10 seers of woodash per palm.

One-third of the above quantity of manures should be applied to palms, from 1 to 5 years of age, $\frac{1}{2}$ up to 8 years and the full quantity thereafter.

IX. BANANAS OR PLANTAINS.

At the time of putting and as each sucker comes out, apply a mixture of 25 cart-loads of farmyard manure or 10 cart-loads of compost and 10 cwts. of groundnut cake to every acre of 600 pits.

X. COFFEE.

In March, just before the blossom showers or in September immediately after the rains, apply by broadcasting evenly between rows of plant—

(a) *In heavy bearing areas (where an average of 7 to 10 cwts. of clean coffee per acre has been picked).*—Three hundred and eighty-five lbs. of a mixture made up of 150 lbs. of groundnut cake, 40 lbs. of sulphate of ammonia, 75 lbs. of concentrated supers and 120 lbs. of a mixture of equal amounts of chloride and sulphate of potash.

(b) *In evenly bearing areas (where 4 to 6 cwts. of clean coffee has been picked).*—Two hundred and eighty lbs. of a mixture of 100 lbs. of groundnut cake, 40 lbs. of sulphate of ammonia, 60 lbs. of concentrated supers and 80 lbs. of a mixture of chloride and sulphate of potash to every acre of 1,200 bushes of coffee.

(c) *In normal areas (where 4 cwts. or less of clean coffee has been picked).*—Two hundred and forty lbs. of a mixture of 150 lbs. of groundnut cake, 50 lbs. of concentrated supers and 40 lbs. of sulphate or chloride of potash to an acre of coffee.

Half the dose of mixture (c) may be given to non-bearing plants of 2 to 5 years old. Potash may conveniently be omitted till the plants come to bearing.

Coffee (cherry) husk compost containing as it does appreciable amount of nitrogen and potash may be substituted for other bulk manures. One of the following mixtures may be used as a substitute for mixture (c).

(d) Six cwts. of coffee husk compost and 112 lbs. of steamed bonemeal, or

(e) A mixture of 5 cwts. of coffee husk compost, 10 lbs. sulphate of ammonia, 50 lbs. of concentrated supers and 8 lbs. of sulphate or chloride of potash.

In the case of an exceptionally heavy cropping year, a second application equivalent to half the above quantities may be advantageously given. This helps both the crop on the bush and the throwing out of fresh wood for the next crop.

A regular programme of application of bulk manures (of the farmyard manure or compost type) at about 5 to 10 tons per acre once in every four years would be a most advisable procedure. For this purpose the estate can well be divided into four portions, each portion being dressed with bulky manures once in four years.

Periodical testing of soils for acidity or lime deficiency is necessary in the case of coffee soils and should be undertaken at least once in 5 to 7 years. Wherever necessary requisite quantity of freshly slaked lime should be applied to the soil immediately after the harvest is completed. Liming should, however, be done only after testing. Irresponsible application of lime is just as dangerous to plant growth as lime deficiency itself. Manuring may be deferred for at least 2 months wherever lime has been applied.

XI. ARECA.

Every year early in September or October dig a shallow circular trench 1 foot from the base of the palm and fill with farmyard manure at the rate of 10 cart-loads to every acre of 400 palms. Cover with the excavated earth and mulch thickly with at least 5 cart-loads of leaf mulch per acre.

Apply further once in every three years 780 lbs. per acre of a mixture of 200 lbs. of groundnut cake, 80 lbs. of sulphate of ammonia, 400 lbs. of supers or bonemeal and 300 lbs. of sulphate of potash (if available).

XII. CARDAMOMS.

Apply early in September or in March by broadcasting evenly between plants 5 cwts. per acre of a mixture composed of 3 cwts. of castor cake, 1 cwt. of steamed bonemeal and 1 cwt. of chloride of potash.

XIII. CHILLIES.

Plough in 4 to 5 cart-loads of farmyard manure or 2 cart-loads of compost per acre 2 to 3 weeks before transplanting. Apply thereafter at the time of transplanting a mixture of 40 lbs. of groundnut oil cake, 100 lbs. of supers or bonemeal and 50 lbs. of sulphate of potash. Three to four weeks after transplanting apply a further 100 lbs. of groundnut oil cake.

It is to be noted that fertilizers are only advisable for chillies grown as a commercial crop.

XIV. POTATOES.

Ten cart-loads of farmyard manure are ploughed in 2 to 3 weeks before planting and a mixture of 3 cwts. of groundnut oil cake and $1\frac{1}{2}$ cwts. each of concentrated supers and sulphate of potash, just before planting.

ORANGES AND LIMES (LEMONS, ETC.)

The trees are manured early after the first showers of rain in March or during September after the rains.

For bearing trees apply 1 ton of compost to the acre and such quantities of the following mixture as are indicated below :—

Ammonium sulphate	80 lbs. or 200 lbs. of groundnut oil cake.
Concentrated supers	75 lbs. or steamed bonemeal 150 lbs.
Sulphate of potash	100 lbs.

255 lbs.

Apply 6 to 8 lbs. of the mixture to each orange tree bearing 4,000 fruits or more; less may be applied according as the number of fruits borne by each tree is less.

In the case of limes apply 3 to 4 lbs. of mixture to each tree bearing 2,000 fruits or more; prorata if the number of fruits borne is less.

In either case if the plants are not bearing 1 to 2 lbs. of the following mixture may be applied to each tree according to age :

Ammonium sulphate	80 lbs.
Concentrated supers	75 lbs.
Sulphate of potash	60 lbs.
	215 lbs.

The orchard is inter-cultivated at least twice during the year and a cover crop of leguminous plants taken and ploughed in.

MANGOES

Apply 6 to 8 lbs. per tree if in bearing; and 2 to 4 lbs. for seedlings and young plants of the following mixture :—

Ammonium sulphate	80 lbs.
Concentrated supers	75 lbs.
Sulphate of potash	60 lbs.
	215 lbs.

5 baskets of compost are also applied to every tree.

The orchard is inter-cultivated at least twice during the year and a cover crop of leguminous plants taken and ploughed in.

APPLES.

Apply to each tree 2 lbs. of a mixture made up as follows :—

Castor cake	250 lbs.
Supers or bone meal	175 lbs.
Muriate of potash	125 lbs.
	550 lbs.

To those trees from which crop is being taken apply in addition 1 lb. of groundnut cake or $\frac{1}{2}$ lb. of ammonium sulphate each.

Apply the manure just after the first showers at the commencement in March or after the rains are over in September or thereabouts.

Every year 5 baskets of compost are also applied to each tree.

The orchard is inter-cultivated at least twice during the year and a cover crop of leguminous plants taken and ploughed in.

BIOLOGICAL CONTROL OF SUGARCANE STEM-BORER

By B. KRISHNAMURTI, B.Sc., F.R.E.S.

Government Entomologist

The chart bearing this title is self-explanatory. It makes out three principal points: (1) The possibility of the control of the Sugarcane stem-borer pest by means of one of its natural enemies. In this chart, is depicted the case of a very small wasp (*Trichogramma minutum*) which attacks and kills the small eggs laid by the adult borer-moth (*Argyria sticticrasis*) and out of which originate the borers that bore into the young cane shoot and destroy it. (2) Artificial mass-breeding and production of this enemy-wasp in the laboratory. Such an artificial mass production of this wasp has been found practicable by the utilisation of the somewhat similar eggs derived from another moth *Corcyra cephalonica*—(a pest of stored rice, wheat, flour, etc.) This moth, therefore, forms a very important and valuable source for a large amount of the basic egg-material (artificial or laboratory medium or host) required for artificially mass breeding the enemy-wasp. It is shown in the centre of the chart. (3) Dispersal of this enemy-wasp in large numbers in the fields containing young Sugarcane crop in order that it may attack and kill greater numbers than usual of borer-eggs, which, otherwise, release numerous borers which destroy the cane-crop.

The cumulative effect of the work of this wasp, shows itself in an appreciable reduction of the borer pest and the healthy and normal growth of cane (other factors being favourable). It has been found that the use of this wasp in the control of the borer pest helps in deriving increased yields ranging from one to six tons per acre (depending on the incidence of the pest, soil conditions, seasonal and other factors) over the yields obtained from any crop not having the benefit of its use. About 1000 acres of young cane in the Visweswariah Canal area are being regularly treated with this beneficial wasp. Attempts are now being made to bring larger areas of cane under this treatment.

A SMALL AND SERIOUS INSECT PEST OF CROPS

By B. KRISHNAMURTI, B.Sc., F.R.E.S.

Government Entomologist.

Aphid or Plant-Louse is one of the smallest-sized insects known to infest cultivated crops. (Plate I, Fig. B 1-4). It is commonly known to the Agriculturists as "Hènu" because of a distant resemblance to the small and soft bodied human louse infesting head and body. The plant louse or aphid is not a flat-bodied insect as the human louse; it has, besides, a very characteristic pair of narrow tubes projecting out of its body on either side of its tail; and whereas the human louse sucks blood, the plant louse or aphid sucks plant-sap from the tender twigs, shoots, leaves and flowers and even roots. (Plate I, Fig. A.) The presence of aphids on any plant, is often indicated by the presence of certain ants there, because the ants eagerly imbibe the sweet fluid excreta thrown out by the aphids.

Compared to the other kinds of insects that affect cultivated crops, the aphid, in spite of its small size, is capable of multiplying in numbers at a much faster rate and is a dangerous pest of young seedlings and tender and new shoots; although the quantity of plant sap that each individual aphid sucks out, is very small, it is the aggregate amount of it that hundreds of aphids together can suck out in any given time from any tender portion of the

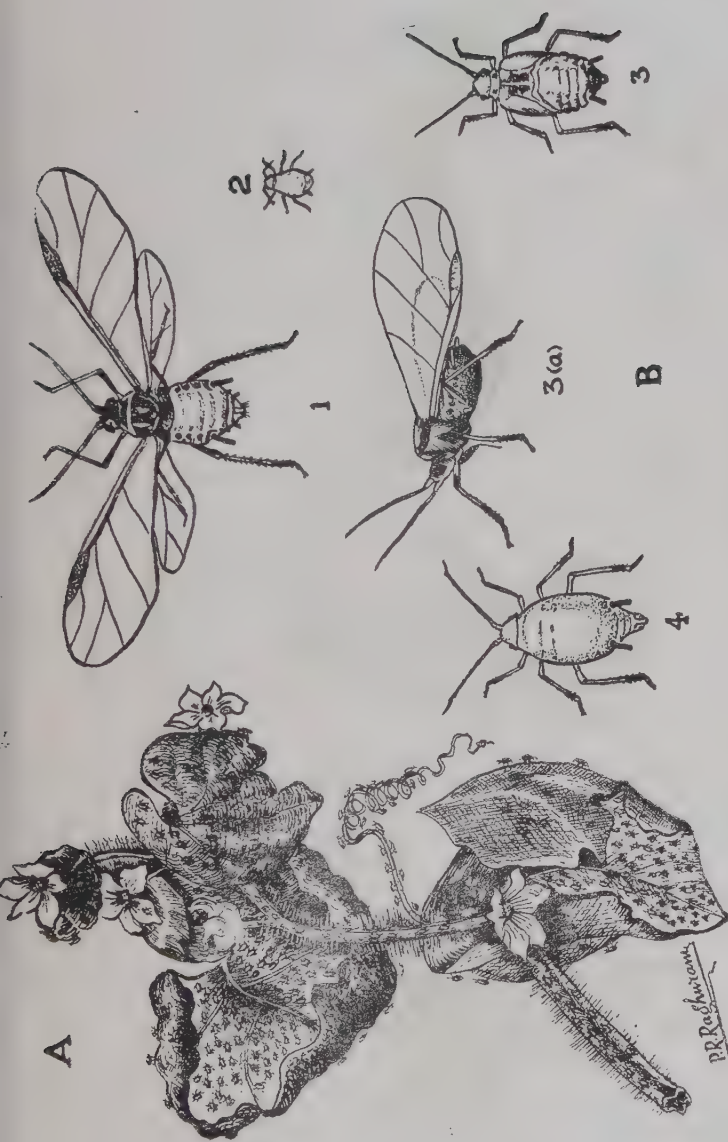


Plate I.

Fig. A. Cucurbit shoot and leaves infested by aphids.

Fig. B. 1. Winged female aphid.

Fig. 3(a) Same (side view).

2 & 3, Young ones

4. Wingless female aphid.



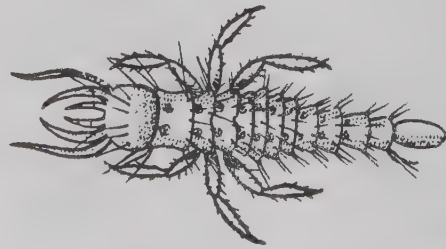
3(b)



1(c)



1'(e)



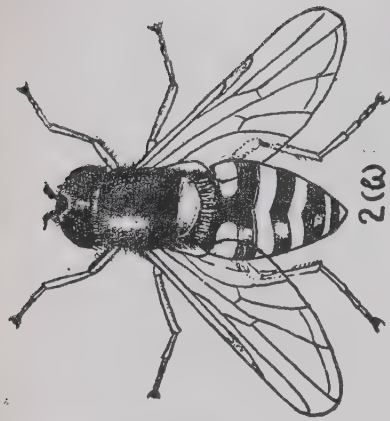
3(a)



1'(a)



2(a)



2(b)

P.R. Raghuram

Plate II.

Fig. 1 (a) Grub
(b) Pupa
(c) Adult } of Lady Bird Beetle.

Fig. 2 (a) Syrphid maggot preying upon an aphid.
(b) Syrphid fly.

Fig. 3 (a) Larva } of I. ...
(b) ...

plant, that makes the plant suffer and die. (Plate I Fig. A.) Besides sucking the sap each aphid throws out drops of its excreta on the leaves below it and such leaves are quickly covered over by a black fungus growth which further helps to make them sickly and finally die.

The aphid found in South India differs from its North-Indian relative in being of female sex only and it is either winged or unwinged; both these forms of the female aphid can reproduce without having to be fertilised by any male of their kind and give rise to fully-formed young ones and not lay eggs as is usual in the case of most insects; each young one takes just about a week to grow up and mature when it begins to reproduce in its turn; when hundreds of such individuals go on reproducing simultaneously and growing up so rapidly it is no wonder that every week, tens of thousands of aphids are turned out which swell the population enormously. Left unchecked, such a huge population can inflict great damage and loss to any cultivated crop in a very short time. Fortunately, however, the aphid is kept under some check in nature by certain other insects which destroy it, such as the Lady-bird beetle, the Syrphid and Lace-wing fly larvae, and certain wasp parasites and some fungi as well. (Plate II, Figs. 1—3.)

In Mysore nearly sixty different varieties of aphids are so far recorded and some two-dozen varieties are now known to infest cultivated crops of all kinds as noted here.

Field crops :—(Food and other).

1. Irrigated Ragi. 2. Groundnut. 3. Jola. 4. Avare. 5. Alasande.
6. Mustard. 7. Cotton. 8. Tobacco.

Vegetable crops.—

1. Cabbage. 2. Pea. 3. Cucumber. 4. Gourd. 5. Brinjal. 6. Pump-kin, 7. Tomato.

Fruit crops.—

1. Lime. 2. Orange. 3. Mango. 4. Guava. 5. Melon. 6. Apple.

Flower plants.

1. Rose. 2. Chrysanthemum.

The check imposed upon this insect pest by Nature by means of insect and other enemies mentioned above, will have to be supplemented by artificial control such as spraying the infested plants, if they have to be satisfactorily protected. Hongey oil or Fish oil soap dissolved in water at the rate of 1 lb. in 10 gallons or Tobacco decoction made by soaking 2 lbs. of dried tobacco leaves in one gallon of warm water for 12 hours, with addition of another gallon of cold water and 2 ounces of washing soap will serve as a very useful and effective material for use by means of a pressure sprayer. The operation of spraying will sometimes have to be carried out more than once at an interval of two weeks and both sides of the foliage should be covered very thoroughly.

It is important and necessary that this aphid pest of crops should be dealt with early and promptly so as to avoid damage and loss and minimise the cost of spraying. The smallness of size of this pest should, on no account, be allowed to induce an agriculturist to disregard it.

BETTER USE OF PHOSPHATIC FERTILIZERS

BY DR. S. V. GOVINDA RAJAN

Agricultural Chemist

Plants need phosphorus for their nutrition and growth just as they need nitrogen, potash and a number of other mineral elements in varying quantities. Phosphorus is essential for improving the quality of a crop, as also for increasing the yield and it is taken up from soil by plants in the form of soluble phosphates. Especially for cereals, phosphate is of pre-eminent importance during the first weeks of active growth and hence it is necessary to give an adequate supply of it to the growing young plant. The usual phosphatic fertilizers used in our State are super-phosphate and bone meal and these contain on the average about 20 per cent soluble phosphates expressed as phosphoric acid.

Phosphatic fertilizers tend quickly to change in the soil into types that are unavailable to plants, *i.e.*, types that are not soluble in water or weak acids like citric acid. In this condition they are said to become "fixed." Most experts seem to agree that in a soil which is neutral or only slightly acid, water soluble phosphate usually reacts with soil calcium to form a type of calcium phosphate only slightly soluble in water, but nevertheless readily available to plants. It will not wash out in the drainage waters and will remain available for a considerable time, perhaps long enough to benefit many crops.

In soils rich in lime, water soluble phosphate is soon converted into relatively unavailable forms and in the interest of economy only sufficient quantity to supply the needs of one crop should be applied.

In very acid soils, water soluble phosphate quickly becomes fixed and almost completely unavailable. In such cases lime (burnt limestone or freshly slaked lime) should be added to neutralise acidity, before soluble phosphate is applied.

It is especially important at the present time when phosphatic fertilizers are expensive and adequate supplies are not available to all, that the utmost benefit from the applied phosphate is obtained by the crops. Complete fixation is least likely to occur when phosphate is concentrated in the vicinity of plant roots, since not all of it is then in close contact with the soil. In the alternative, gradual release of phosphates into the soil in soluble forms through mineralisation of organic compounds will minimise fixation and enable plants to absorb them as they become available. This can be achieved by one of three methods: (1) by proper "placement" of the fertilizer (2) by applying it mixed with farmyard manure and (3) by raising leguminous crops fertilized with phosphates and using them as green manures.

The advantages of the above three methods will be detailed here:

(1) Application of fertilizers close to the root zones of crops by a suitable technique of "placement" will enable a more satisfactory utilization of nutrients by the plant roots than if they are spread over the entire soil surface as in the usual practice of broadcast applications. This is particularly true of fertilizers like phosphates which tend to get fixed in the region of application, unlike nitrogenous materials which are readily soluble and can move through soil easily. Experiments have repeatedly shown that placement of phosphates 3" to 6" below the surface in furrows gives 20-30% more yield of ragi. A convenient method of application is to drill the usual dosage of phosphates ($\frac{1}{2}$ cwt. of superphosphate or bone meal) at the required depth through saddles attached to a plough and to sow or transplant ragi seedlings in the furrows thus made. The above method is fairly simple in operation

and the extra labour involved is more than balanced by the increased yields obtained. The practice is also capable of effecting economy in the fertilizer applications.

(2) Mixing phosphates with farm manure prior to application to soils, seems to indicate the increased recovery of phosphate from superphosphate by crops. Possibly this also has something to do with avoidance of direct contact with the soil. In addition, there would be some liberation of (CO_2) from the decomposition of the organic matter and this would increase the availability of the phosphate. A practicable method is to mix the phosphatic fertilizer thoroughly with farmyard manure, applying it broadcast and later harrowing it into the soil.

(3) Legumes are usually equipped with a deep and extensive root system which enables them to feed strongly on phosphates and to absorb a much larger proportion of the added phosphates than shallow rooted cereals. Phosphates enhance the activity of micro-organisms associated with the root-nodules of legumes and thereby enrich the plants in their nitrogen content and also help to produce more plant material. The increased growth of the crop obtained through phosphate fertilization represents a larger intake of phosphorus from the soil and formation of a larger amount of organic phosphorus compounds. When these crops are turned into the soil as green-manures, the decomposition of the plant materials cause the steady release of the phosphorus in soluble mineral forms which become available to the succeeding cereal or other crops. Also the liberation of (CO_2) from the decomposition of the plant material would assist in increasing the availability of the phosphates present.

Experiments conducted during recent years indicate that applications of superphosphate or bonemeal at the rate of $\frac{1}{2}$ to 1 cwt. per acre increase the green matter yield of legumes like groundnuts, sunhemp and dhaincha by 20 to 50 % and that the use of these as green manures to paddy without further applications of phosphatic fertilizers give higher crop yield than treatments involving application of same dosage of phosphates directly to the paddy crop. The improved practices yield 10-25% more yield and hence are distinctly advantageous.

From the foregoing it will be clear that a proper understanding of the soil nature, soil reaction and the type of crops grown are necessary for making the best use of phosphates and deriving the maximum advantage from their use. In cases of doubt the ryots will be well advised to consult the Departmental Chemical Laboratory for testing their soils and for giving guidance. This service is free to bona-fide ryots of the State.

PASTURE GRASSES

BY G. SRINIVASA IYENGAR

Senior Asst. Botanist

Mysore is essentially an agricultural country with a large population depending on their lands for their subsistence. To feed the growing population, not only are the existing lands made to yield more but all the available lands are also brought under the plough. This, of course would mean the maintenance of more cattle which not only serve as the entire motive power but serve also as a very big source of soil fertility. With the rapid encroachment of all available lands for cultivating food crops, the pastures which formed the main stay for the supply of green grass and hay to the working and milching cattle are dwindling away. The importance of pastures has not been realised

in our country as in some of the foreign countries. In these countries the pastures have contributed to a great deal to maintain cattle of these areas in an ideal state of health and thus adding to the quality of Beef, Mutton, Wool, etc. The national wealth has thus increased.

On the other hand India as a whole and Mysore in particular is poor in pasture lands. It is still poorer in canal areas where every inch of land is under either under a food crop or a money crop. This encroachment on pasture areas have been much to the detriment of cattle wealth. The solution for the increase of the forage in the existing pastures can only be found in introducing heavy yielding types of grasses whether exotic or indigenous which have very high nutritive value.

Attempts are being made in Mysore for the past several years to increase the outturn of green fodder by introducing heavy yielding types. As a result of these trials Napier grass and *Panicum antidotale* were introduced. Side by side with the introduction of the above two varieties, thirteen exotic and indigenous types of grasses and one hybrid type are under test on the Visvesvaraya Canal Farm, with a view to discover useful species, strain and forms from the point of view of yield and quality.

The Grasses may be classified into the following categories :—

A. Pasture grasses

1. Annuals.
2. Biannuals.
3. Perennials.
 - a. Bunch grasses.
 - b. Stoloniferous grasses.
 - c. Rhizomatus grasses.

B. Hay grasses.

(1) Annuals, (2) Biennials, (3) Perennials.

Annuals :—By annual grasses we mean those which grow only for one season and have to be seeded if they are to be established. As pasture grasses they are deemed of little value. The biennials are similar to annuals.

Perennial grasses are long lived and the same plant will grow for a number of years. It is amongst these grasses that search is made for pasture types, as once established and well managed they will last for years which is more an economic problem than reseeding with annuals every year. A perennial pasture is more easily managed than an annual pasture, especially if the grass used is stoloniferous.

Bunch grasses are those which form bunches or tufts and have no rhizomes. The propagation is by means of seed. From a pasture point of view, grasses with this habit of growth, though they may afford useful pasturage, have certain shortcomings. One of the main shortcomings is that the propagation is by seed. This necessitates careful management, correct resting and the selection of a grass which seeds freely and whose seeds germinate easily. Another disadvantage is that the tufted grasses never form a dense sward (except in high rainfall areas) unless the grass is specially selected for the purpose. Many of these bunch grasses have exposed crowns or crowns in which the buds are not protected and these easily get trampled and die out. These tufted grasses too have an upright habit of growth sending out many flowering heads which is not an ideal type for grazing.

Stoloniferous grasses are those which cover the ground by means of stolons or runners. It is in this group of perennial grasses that attention has to be focussed with the hope that it is amongst these that the solution to our pasture problem will be found.

Grasses with this habit of growth have various advantages over other types. They cover the ground quickly and form dense swards by rooting at nodes and develop new plants at these points. Stoloniferous grasses, too, are low growing in comparison with bunch grasses. This has a distinct advantage as most low-growing grasses make much more leaf than stem—a feature required in a good pasture grass with a high forage.

c. *Rhizomatous* grasses are those with under ground runners or rhizomes. These grasses can usually stand for the largest period and are the last to disappear from the pasture that is heavily grazed.

In the tests conducted so far on the Visveswaraya Canal Farm, thirteen varieties comprising of the perennial grasses, viz., bunch grasses and stoloniferous grasses, para grass and the giant star grass are found to be heavy yielders. These two grasses are described in this note.

Para grass.—This is probably a native of South America. It is a rank growing perennial, spreading by runners, 30 or more feet in length, which form roots at each joint that touches the ground. As soon as the ground become fairly well covered with these runners, erect or ascending branches are produced reaching a height of 2–4 feet or even more, making a heavy yield for either hay or grazing. It makes moderately fair growth on moderately dry soil. It does much better where the rainfall is heavy. It is a desirable species for planting on lands where irrigation facilities exist. It is scarcely injured when covered by water for a fairly long period.

Para grass produces little good seed and is usually propagated by divisions of the stem. These root readily if cut into pieces of two or three joints each and planted into freshly ploughed ground so as to leave the upper node or joint just at or a little below the surface. It is planted in rows two feet apart with a planting distance of 2 feet between each set.

This grass makes rather a course hay but is sweet, tender and nutritious and the yield is very high.

The frequency of cutting will depend on the rainfall, frequency in irrigation, the nature of soil and the extent of manuring. A general rule for guidance is to cut before the stems become hard. The heaviest yield over a year is obtained, when the interval between the cutting is comparatively long, but the advantage is counter-balanced by the wastage when cattle reject those portions which are too mature.

Three cuttings per year are obtained and at each cutting an yield of 4 tons to an acre is obtained. The harvestings are so arranged that the last cuttings are made in the month of November, as otherwise, the shoots have a tendency to flower during November.

A field well set with this grass can be kept in a good condition almost indefinitely. After each cutting a liberal application of compost is given followed by inter-cultivation both ways such that the plants are thinned out considerably. Irrigation may be given as and when necessary. This is also excellent for pasture, when not grazed too closely. The plants will easily be killed during long periods of drought.

Giant Star grass.—This is an East-African species closely related to *Cynodon dactylon*—The *haria*li. It is a rank growing perennial, vigorously spreading by stolons, often 40 feet or more in length which form roots at each joint that comes in contact with the ground. It is propagated by cutting up the shoots and roots and spreading these over the surface of prepared soil, or depositing them in furrows, each row of cuttings being covered over by the preparation of the next furrow or by hand dibbling the cuttings all over the field. This grass is best suited for pastures maintained under rainfed conditions. This is one of the few grasses that keeps green even under dry

conditions. During the rainy season the grass is inter-cultivated after the application of compost. Under irrigated conditions this gives very high yields. It is difficult to eradicate. Three cuttings can be obtained per year. In the test plots on the Visveswaraya Canal Farm the first cutting has been completed and an yield of $3\frac{1}{2}$ tons to an acre has been obtained. The experiment is in progress.

KACHU GEDDE

BY M. H. MARI GOWDA, M.Sc. (Luck.), Ph.D. (Har.)

Superintendent, Department of Horticulture.

Colocasia esculenta Schott :—Colocasieae, Araceae, Monocot.

There are 300 to 400 cultivated varieties (some from *C. antiquorum*), the local names of the varieties in each country where grown being based on the nature of the varieties or of its uses. Naturally the common names of the cultivated varieties of these food-tubers vary according to the language of each country.

India:—Arvi, Kachu, Kachchi, Shame Gedde.

Ceylon:—Kiri-ala, Daesi-ala, Kand-ala, Sevel-ala, Gahala.

Origin and Distribution:—Probably India is the original home. It has now spread and is found in all parts of tropical and sub-tropical countries; its westward spread from India to Egypt was probably in the beginning of the Christian era and from there it has found its way into Italy and Spain. The kachu (the Taro) probably come first to America from Spain. Probably it also found its way to East Africa as early as when it entered Egypt. In the east of India and in all the Pacific Islands, Taro had been the staple starchy food of the people since a very early period. Undoubtedly it is more widely distributed than the yam and it was more popular before the sweet potato was unknown to the Old World; even now it is of some importance in Hawaii, New Zealand and other Pacific Islands. A few decades back, in America, the offices of Foreign Seed and Plant Introduction, under the Bureau of Plant Industry tried to introduce several varieties and to popularise cultivation in the warmer parts of the States. As such the Taro is now found in all parts of tropics and sub-tropics of both the New and Old Worlds. It can be said that it can grow and be found in all rice growing areas as its requirements are almost similar to that of rice.

Cultivation:—It requires water like rice. In Egypt it is grown in the irrigated valleys of the River Nile. It is well suited for swampy and river side lands of the tropical countries. Some varieties are adapted to drier areas but in dry seasons require irrigation. Rich soil with plenty of water supply gives best result. Planting distance is $3' \times 3'$ or $2\frac{1}{2}' \times 2'$; cut tubers are used and planting is done as in the case of potato tubers.

Harvest and yield:—The time of harvest varies according to varieties. There are varieties that come up in 3 months (the earliest) and others in one year (latest). Between these there are 4, 6 & 9 month varieties and there are many prolific varieties like Mock-tannis in Trinidad which yield 3.5 tons per acre. The tubers are easy to harvest as they lie superficially in the soil. The keeping qualities vary according to the varieties. Those grown in dry regions under irrigation can be left in the dry soil unharvested till they are required but in the wet area if left unharvested the tubers begin to sprout. The harvest usually begins as soon as the leaves begin to die off.



TUBERS

Colocasia esculenta

• COLOCASIA ESCULENTUM, SCHOTT



TWIG.



SEED



FRUIT

Illustrated by R. H. S. S.

ALEURITES FORDII, HEMSL

Parts eaten :—Tubers are the chief starchy part used by man and also as animal fodder, but there are some varieties of which the young leaves and petioles are also used. In Philippines these edible leaves are cooked and eaten and they also prepare a fermented paste of the tubers called "Poi" which is considered to be very palatable. In Jamaica, the tubers are eaten and used just like potato. It is said that leaves (tender edible ones) make an excellent soup. In Malaya it is boiled and eaten under the name "keladi telur."

Different ways of preparing the tubers to eat :—(1) Baked taro-par-boiled 10-15 minutes and then baked in the oven, warm sliced taro then eaten with salt and butter or gravy. (2) Plain boiled taro boiled with skin if small or cut into small pieces if large and boiled, the water is thrown away and the tuber is peeled and the sliced tuber is eaten with salt and butter. (3) Riced or mashed taro-boiled or parboiled and baked tubers peeled and riced or mashed thoroughly and seasoned with salt, butter, milk, etc, according to taste and used just like mashed potato. (4) Taro flakes or granulated taro-boiled or parboiled and baked taro sliced and chopped and grinded, salted and heated quickly with top dressing of cheese and browned in the oven and eaten. The parboiled and baked taro or boiled taro could be used in taro-hash, for filling for fowl and other meats, for taro-crisps, for taro-cream, for scalloped-taro, for taro-sauce and for french fried-taro.

Other uses of parts :—The stem is often used as an application for wounds and for snake bites. Leaves with moist sugar are used for wounds the spathes are often used as poultice for wounds.

It has been attempted to use tubers in the industrial alcohol preparation and the plant mucilage, in the paper industry in some countries.

Chemical analyses of taro :—The most objectionable property of many varieties is its acidity and it is due to the raphides or needle like crystals of calcium oxalate. These occur in the cells of the tubers and in all other parts of the plant as bundles, only selected varieties free from these may be grown and precaution in parboiling and often double boiling may be taken to get rid of these poisonous oxalate crystals. The starch grains are very small and difficult to extract. The starch contents on average forms about 18% of the tuber and on average about 75% of water. As compared to other tubers like potato, manioc, sweet potato, yam, etc., it has a greater amount of cellulose, but it has slightly higher contents of fat than other tubers. The edible cooked leaves made in Philippines contain.

Protein	...	4.1 %
Carbohydrates	...	2.05 %
Water	...	87.8 %

Conclusion :—Some of the acid-free varieties are still very popular in many parts of the world. Plant breeding being so advanced it is not difficult to combine many different good nutritive qualities of different varieties of taro into a few prolific varieties. It could be made use of for many purposes in addition to its being already a staple food for many tropical peoples. Taste differs and many prefer taro as more wholesome than many other tubers. Very few food plants have so well adapted to tropical swamps as taro has done.

TUNG OIL

BY M. H. MARI GOWDA, M.Sc. (Luck.), Ph.D. (Har.)

Superintendent, Department of Horticulture.

Family : Euphorbiaceae (Archichlamydeae)

Scientific Name : Aleurites Fordii Hemsl.

Common Name : Tung Oil Tree ; China Wood-oil Tree.

Distribution :—Original home :—native to central and Western China.

*Present day :—*Introduced to many countries. The U. S. Department of Agriculture introduced this valuable tree in 1905 ; now over 150,000 acres are under tung oil trees in the States of Mississippi, Louisiana, Florida, Alabama, Georgia and Texas.

It has been introduced to Lalbagh at the tail end of last Century. The one tree in the economic garden of Lalbagh has fruited several times and produced seeds in thousands. Unfortunately no action has been taken to increase its cultivation in spite of our having a varnish and paint industry for which the oil is imported from outside Mysore.

*History :—*It grows in China in waste land-ditches, banks, hill sides and produced fruits. It is perfectly hardy and resistant to drought. Though the oil is known and used by Chinese for several hundreds of years, the Chinese seems to have not given any attention to the cultivation of this tree. The United States uses so much tung oil, that it took interest in cultivation of this by modern plantation methods and tung oil industry has become of great importance. In our State, it is worthwhile taking up its cultivation on large scale.

*Growing and Gathering :—*It is a tree 25 to 40 feet tall, leaves cordate, often with lobes 3 or more, dark green, fruit spherical 2 to 3 times in diameter, borne singly or in clusters ; on maturing the fruits turn deep green to dark in colour and each contain 3 to 7 seeds (usually 3 seeds). The tree is propagated from seeds. It is said to thrive well in hilly regions, the altitude exceeding 2,500 feet ; but in U. S. it thrives profitably in good soils only.

It has been experimentally found out in the U. S. that this tree is damaged by temperatures below 26 to 28 degrees F.

*Harvesting :—*The harvesting of the seeds for oil expressing is very simple. The mature fruits fall to the ground and allowed there to dry. They are, then hand collected and sacked or placed in covered sheds with free access to air. The fruits are thus allowed to dry as much as possible, since moisture contents of the seeds prevents them from yielding high percentage of oil. Further by allowing the fruits to dry under the tree on ground, the husk becomes easily removable by hand.

*Processing :—*In China all the processes, *i.e.*, harvesting, shelling, grinding the kernels and extraction by hand pressing are all primitive. The husked seeds are carried in baskets slung on poles to small mills where the oil is expressed by hand in a crude and unique type of wooden press.

*Modern Method :—*A modern mechanical expressing mill was erected in America in 1928, by the Alachua Tung Oil Company in Florida. Now there are many such modern mills in America with equipments for decorticating the fruits, grinding the kernels and expressing the oil from the kernels. Many researches also have been conducted to extract the traces of oil left in the cakes by means of solvents. The cakes is of no use for cattle feeding.

*Economic importances and uses :—*The tung oil is the most important drying oil available for modern industries—like manufactures of paints, manufacture of goods like water proofing materials and insulating materials, etc. It has several advantages over linseed oil.

In America the oil is used in industries to make varnishes, enamel paints, floor paints, flat wall paints, paint driers and to make water proofs, in manufacture of oil-cloth, linoleum, and water proofing cloth; in electrical industries it is largely used to make insulating compounds for cables, dynamos, motors, etc. It is a very good preservative in paints and highly valuable for outside painting as it is very good resistant to weathering. Boatmen prefer it as it is little affected by salt waters. The Chinese use the crude oil to coat the boats and to make caulking material for boats; they use also the crude oil as protective covering to the house, furniture and other household wooden articles.

Conclusion:—Its importance can be gauged by that in 1937, over 175 million pounds of this drying oil was imported from China to U. S. Its superiority over the linseed oil is another factor for its importance. It has revolutionised the varnish industry in America. It gives a glossier finish to the paints, and it is much more like enamel in this respect, provides smooth surface which can be washed; it is more resistant to fungoid attacks than ordinary paints.

The U. S. Department of Agriculture brought the tung oil seeds from China for propagation in 1905 and by 1946, the home production rose to over 15 million pounds that year. According to 1947 estimation over 150,000 acres are under tung oil tree cultivation, mostly in Mississippi, Louisiana, Florida, Alabama, Georgia and Texas. Doubtlessly there is wide scope for its large scale cultivation in Mysore State also.

FUNGICIDAL TREATMENT OF SEEDS

BY S. V. VENKATARAYAN

Plant Pathologist

About the middle of the seventeenth century a ship full of wheat was wrecked near the coast of Bristol, England. The grain was too much soaked with sea water to be of any use in milling. A portion of it was used for seed in the next season and the crop was free from "smut" or bunt. This led to the practice of "brining" the seed wheat. Sodium chloride has no effect on the bunt. What little beneficial effect there was of the sea water might have been due to the indirect effect of the brine in removing light and otherwise useless grain. It was not realized at the time that the seed being foreign, might have been free from bunt and that even if it had not been soaked in sea water it might have given a bunt-free crop the next year.

The next step in the process of seed treatment was the use of copper sulphate instead of salt in 1761 in Switzerland. Nothing was heard of this for a long time. In 1807, Prevost of France, working on the germination of bunt spores, discovered that they failed to germinate when spore suspensions were made in water from a copper vessel. He then experimented with the copper salts. The copper sulphate treatment for cereals became popular only by the year 1860, but on account of its harmful action on germination, the search for a proper disinfectant continued. The use of copper sulphate solution against smut on Jola (kadige roga) has been popular in Mysore. The necessity to dry the seed before sowing acted as a draw-back for this treatment. This led to the adoption of the copper carbonate dust treatment for wheat bunt. Monohydrated copper sulphate dust used on paddy and ragi has given good results.

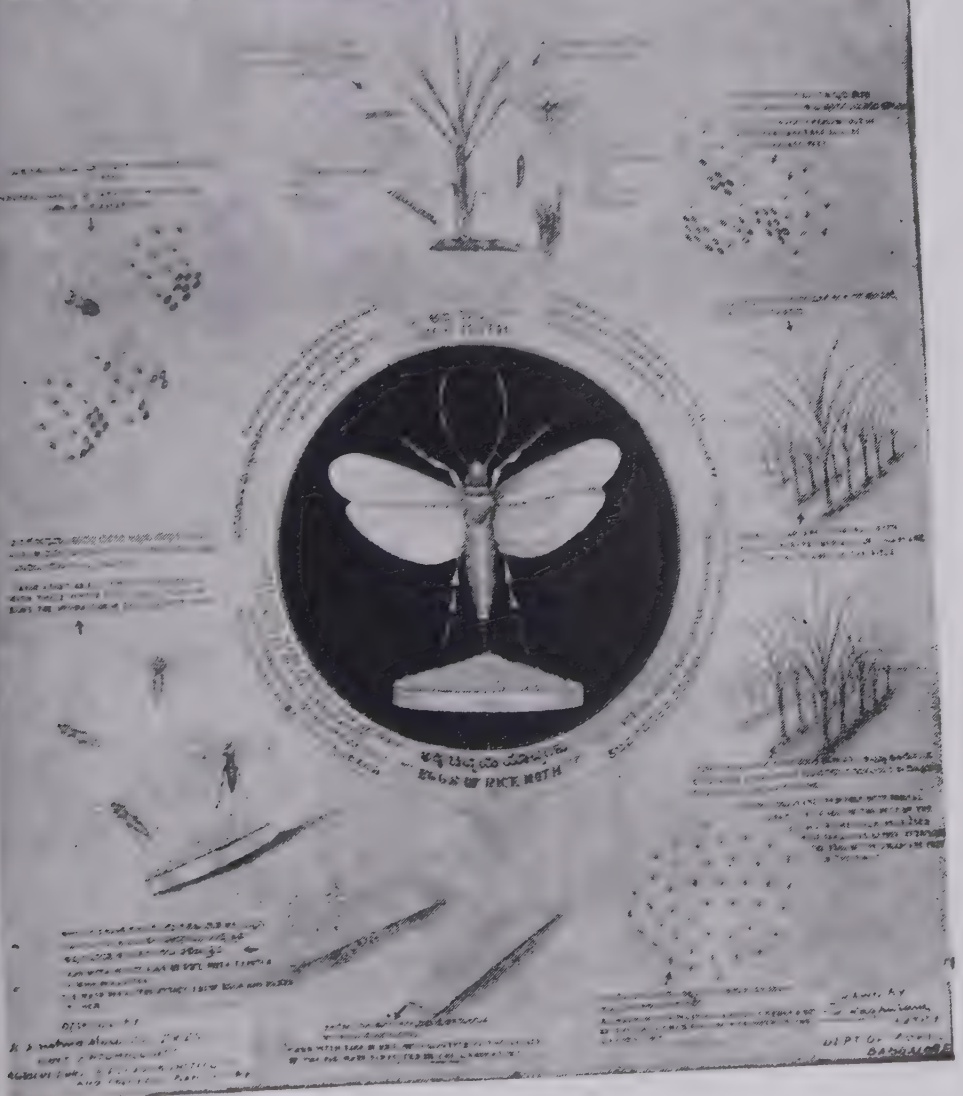
The scarcity of copper in World War I stood in the way of an extension of the copper carbonate treatment. Organic mercury seed disinfectants were developed in Germany from 1915, and became well established before 1930. Of these mention may be made of Ceresan (European), Ceresan and New Improved Ceresan (American), and Agrosan G. N. (English). The search was, however, not to end. The dearth of mercury in World War II led to the use of organic fungicides. Of these the dithiocarbamates represented by fermate, and the thiuramdisulphides or T. M. T. D. for short, represented by arasan and nomersan are popular. Fermate is, in addition, a protective spray fungicide on fruits and vegetables. But in Mysore its employment against areca koleroga in the malnad was not successful. In seed treatment experiments, Agrosan G. N., T. M. T. D. and nomersan have reduced the incidence of infection of leaf blight and foot-rot of ragi caused by *Helminthosporium nodulosum* and given better yield than other treatments and control. The leaf-spot and earhead blight of paddy caused by an allied fungus, sometimes occurs in a severe epiphytotic form as in Bengal during 1942-43, and is considered to be one of the major causes of the shortage of winter paddy leading to the famine of that year. The loss of crop varies from 50-90 per cent, according to the variety. The only way to avoid the loss is by seed treatment with fungicides to kill the spores that may be present on the surface. Against a wilt disease of coriander which is apparently seed transmitted arasan and fermate treated seed have given better germination, and a better stand. The fermate treated plot had a darker green colour.

Dry dusting with flowers of sulphur or finely powdered sulphur of 200 or 300 mesh fineness, was found effective against bunt of wheat in America in 1923, and this treatment has been adopted in India against smut on Jola. In Mysore also it has been found effective, as also dry dusting with the new dusts fermate and arasan. Even soaking in cold water for four hours and drying in the shade, although not so successful as the fungicide treatments, is better than control. In Egypt, sulphur treatment has been used against smut of barley, and is not only considered simple and fool-proof, but carried out immediately after harvest, to give protection against insect pests in storage.

This surface disinfection is not useful against fungus parasites carried within the seed as dormant mycelium as in the loose smut of wheat. This requires treatment with hot water of a particular temperature. In North India where the day temperature in summer is high, the sun's heat is successfully employed in getting rid of the infection. The hot water treatment has also been employed to control bacterial diseases of cabbage and other cruciferous crops transmitted within the seed. It has been employed with partial success for treating cotton seed against angular leaf spot or black arm in America, and potato tubers against ring disease in Madras. Sugarcane cuttings from sereh-diseased and chlorotic-streak infected canes after a hot water treatment have grown into healthy plants in Java and Australia.

The cost of the fungicide treatment of seeds is insignificant, only a very small quantity of two to three ounces of the dust being required to treat sixty pounds of seed. The cost of coriander seed treatment per acre comes to only three or four annas, and the increase in yield that may be expected by treatment will be one to two pallas per acre.

BIOLOGICAL CONTROL OF SUGARCANE STEM BORER



Refer page 86



Pea plant heavily infected by powdery mildew, showing the sense growth of the fugus on the leaves on young green parts and an unaffected leaf X.

POWDERY MILDEW ON PEAS AND ITS CONTROL

BY N. S. VENKATAKRISHNIAH

Asst. Plant Pathologist

Powdery mildew caused by the fungus *Erysiphe polygoni* D. C. is a serious menace to the cultivators of peas. It assumes an epidemic form in Mysore during the winter months, November to February, when there is a heavy dew fall followed by the intense heat of the sun. The fungus thrives under conditions where the plants are under shade or too thickly planted. Unlike other fungous diseases it is not much in evidence during the rainy season. The disease appears usually when the crop is about 40--45 days old and begins to flower.

Heavily infected plants in the field present an ashy white appearance at a distance. The infection generally starts from the lower leaves and spreads rapidly to the other parts above. The fungus penetrates only the external cells, grows superficially as a whitish, powdery coating on the green stems, leaves, tendrils, flowers and pods and causes blotches all over the infected portions. (Fig.) In severe cases the plants remain stunted in growth. The infected shoot and flowers wither. The leaves become thickened, reduced in size, shrivel and begin to shed in large numbers. The fungus draws away all the nourishment that should properly go to the plant. This tells upon the vitality of the plant with the consequential reduction in yield.

The powdery appearance is due to the production of millions of minute, dusty spores which are thickly deposited on the surface. These spores are easily disseminated through wind and spread the infection in moist weather from field to field. The disease persists by means of special spores (ascospores) formed within minute, black, spherical bodies (perithecia). These are developed in great numbers amidst the white mycelium on the leaves at a late stage of the infection. They are capable of withstanding the vicissitudes of nature and carry the infection from season to season in the field. The fungus infecting the pod also invades the developing seed and hibernates within it. When such seeds are sown the fungus resumes its activity and attacks the growing plant.

Any factor that promotes healthy growth will serve to reduce the disease. Clean cultivation, good ventilation and sunshine, use of healthy seeds obtained from disease free crop, collection and destruction of all infected plants as soon as they are noticed keep the disease under control. Seeds obtained from infected crop were treated with hot water at 50° - 54° C for 20 minutes and sown at the Government Central Farm, Hebbal, Bangalore. The treatment hastened the germination. The plants showed a more vigorous growth than those from untreated seeds. This treatment kills the fungus that lies within the seed and reduces the initial infection carried by the seed. But it involves the use of an accurate thermometer and a certain amount of care in the maintenance of the particular temperature.

The infection on the grown up plants can be controlled by the application of sulphur dust at an early stage of infection. The treatment tried at Pama-krisnna, Krishishala, near Bangalore on 30-45 days old crop controlled the disease effectively and gave an increase in yield of 20 per cent over the untreated crop. The sulphur should be fine passing through a sieve of 200-300 meshes per inch. It must be applied by means of a good duster evenly and thinly at the proper time. The dusting is best done in the early hours of the morning when the plants are still wet with dew and when there is no wind. The quantity required varies with the age and growth of the plants. About 20-25 lbs. of sulphur is required to treat one acre of 30-60 days old crop. The cost of application calculated on the present cost of chemical and labour comes to about seven to nine rupees per acre. This small expenditure on the protection of the crop is amply rewarded by the increased yield of the crop.

THE COMMON CUTWORM AND ITS CONTROL

BY SYED USMAN

Assistant Entomologist

Introduction.—The common Cutworm (*Agrotis*), *segetum*, *Euxoa* Schiffermuller. (Lepidoptera, Noctuidae), is an insect of considerable economic importance, and is widely distributed in Europe, Asia and North Africa where it causes serious damage to a variety of vegetable, food and commercial crops. It occurs throughout India, and among its food plants are included potato, cabbage, beet-root, sugarcane (roots), gram, indigo, tobacco, clover and different weeds. In Mysore, it was first recorded as seriously damaging coffee seedlings in the Coffee Districts. More recently in July-August 1950, it wrought severe damage, when it nearly ruined the young *Hein* Ragi crop (*Eleusine coracana*) over extensive areas in Gundlupet Taluk, Mysore District; besides Ragi, it infected young cotton, castor, tobacco and chillies. This is the first time that this pest has occurred on an important food crop like Ragi, which is extensively grown all over Mysore State and forms a staple food of a majority of the people, including cultivators and labour classes.

NATURE OF INJURY AND HABITS OF CUTWORMS.

As the name indicates, these caterpillars cut the young plants near the surface of the ground or a little below it, frequently severing small stems completely so that the young plant is seen lying on the surface of the soil (Fig. 2) or it will be found to have been drawn partly into the ground where it withers and dies. The damage to a young Ragi plant is shown in Fig. 1(e). It is this habit of cutting the young plants and passing from plant to plant while eating so small an amount of food which results in the cutworms being so destructive. Sometimes young crops, such as Ragi, are so badly damaged, that they have been replaced. Cutworms are night-feeders generally, and remain during the day hidden in the soil [Fig. 1(d)], or under clods of earth or some protecting material, and only when we dig down below the surface from one-half to one inch, we will find, coiled up near the base of the plant, from one to one dozen fat, dirty-gray or brown greasy larvae about an inch and a half in length, very obscurely marked Fig. 1(d). They have the habit of curling up into a ring and feigning death when disturbed Fig. 1(c).

DESCRIPTION AND LIFE-HISTORY.

The adult moths measure 1-1½ in. across the expanded wings, and usually dull dusky coloured, with dark-brown forewings having small kidney-shaped spots, ashy narrow circles and brown transverse incomplete lines, and the hind wings being pearly white with a very fine brownish border Fig. 1(a). They are night flyers and greedy feeders upon the honey of flowers.

Eggs are pearly-white, small and spherical, with radiating ribs. They are deposited singly or in clusters on the lower leaves of plants or on the soil; as many as 1,500 eggs are laid by each female moth.

The newly hatched larvae are very active until a suitable food plant is found, and this they attack immediately and feed by biting holes and cuts, chiefly upon leaves and other soft tissue within their reach, keeping themselves mainly under shelter during the daylight; later they develop the habit of burying themselves in the soil during the day and feeding at night, by cutting into the plant stems at about ground level; the larvae are most voracious feeders a few days before pupation, and one caterpillar may then destroy 2 or 3 plants in a night thereby causing serious losses to the crop. The young larva is yellow, and as development proceeds, changes to lead-grey



Fig. 1. The Common Cutworm (*Euxoa segetum*, Schiff).

(a) Moth (b) Caterpillar (c) Same rolled up (d) Same underground
(e) Cutworm damage to young ragi plant.



Fig. 2. Cutworm damage to young cotton seedling.

with an interrupted dark brown band on the back and black hairy tubercles and black spots on the sides; often the markings are inconspicuous. The larvae measure 1 to $1\frac{1}{2}$ inches Fig. 1 (b).

Pupation takes place an inch or two below ground level. The pupae are dark brown, conical and stout, measuring about $\frac{3}{4}$ inch in length.

The life-history of the cutworm occupies about 2 to $2\frac{1}{2}$ months as follows:

Egg—5 to 12 days; Larva—35 to 50 days: Pupa—15 to 20 days.

The first moths seem to appear about the end of July, since caterpillars in various stages of development can be obtained in large numbers from mid-August to early part of October, after which period the pest declines.

CONTROL MEASURES

Usual methods of control against cutworms include hand-picking of caterpillars, use of protective disks and baits, spraying plants with arsenates, dusting with DDT, Gammexane or Hexyclan, trenching to prevent migration, and destruction of adult moths by attracting them to shallow pans containing molasses or light traps. During the recent outbreak in Gundlupet, the pest was effectively brought under control by poison-bait. The bait is prepared by mixing bran with powdered jaggery, which is moistened by sprinkling water, and to this mixture is added Sodium silicofluoride in small quantities and the whole material is thoroughly mixed. The ratio of the ingredients is as follows:

1 lb. of Sodium silicofluoride	} About 10 seers (volume) of the bait mixture is required per acre.
8 seers (volume) of rice or wheat bran	
2 lbs. of jaggery or cheap molasses	
water to moisten	

(A liberal quantity of jaggery in the bait proved beneficial.)

With this bait a 62.5 per cent mortality of the cutworms was obtained in 24 hours in Ragi and cotton fields. The bait should be distributed in the evening so as to avoid the drying effect of the sun. In Ragi fields the bait may be broadcast between rows of plants, whereas in cotton fields, where planting is farther apart and in regular rows, the bait may be broadcast or spread at the base of each plant in a radius of 9". The best season for setting out the bait is immediately after sowing and before the appearance of the young shoots, since it is exceedingly difficult to destroy all the larvae when once the field is infested, and the bait, although evenly distributed, does not entirely prevent damage.

Conclusion.—These cutworms appeared in a pest form in some parts of Mysore District in 1950, and it is likely that they will again appear and cause damage. The cultivators must be on the look-out and adopt the preventive measures well in advance. Land planted with crops during the period June-September should be baited twice, just before the crop is due to appear above the ground; this reduces infestation of the young crop by cutworms (Fig. 2).

A SERIOUS INSECT PEST (GALL-FLY) OF 'HONGE' (PONGAMIA GLABRA)

BY G. P. CHANNABASAVANNA

Asst. Entomologist.

INTRODUCTION

'Honge' (*Pongamia glabra*) is extensively grown in the State both as an avenue tree and in the cultivators' fields, and is a valuable forest tree, yielding a substantial portion of the forest revenues. Besides providing a good and pleasant shade, the tree is very valuable in that almost every part of it is useful: the seeds being used to extract oil, which, in addition to having some medicinal value and also for lighting purposes (particularly in the rural parts), is extensively used in the manufacture of an insecticide, known as 'Honge oil soap'; the profuse foliage and flowers of the tree form a rich 'green' manure for paddy and other irrigated crops. Among the insects that attack this tree, the flower gall fly (*Asphondylia pongamiae*, F) is the most important and serious one. It belongs to the group of insects, popularly known as "gallgnats" or "gall-midges" (Itonididae-Diptera), which are mainly responsible for causing malformation (galls) in the tissue of a variety of plants. The well-known Jola ear head fly (*Contarinia andropoginis*, F.) and the paddy Silver-shoot fly (*Pachydiplosis oryzae*, w.) also belong to this group.

NATURE AND EXTENT OF INJURY

It is a matter of very common occurrence that a majority of the normally almond-shaped fruit pods of this tree are replaced by roundish galls, which are borne on the pod bearing stalks (Fig. 1). In certain years, some trees produce only galls instead of the normal fruits, indicating the extensive activity of the gall-fly, which is the sole causative agency. The fly is injurious only in its larval (maggot) stage and the gall-formation is the result of feeding by the maggot within the flower. If the flower-spikes are examined just after the flowering season, a large number of unopened flower buds are seen together with small, green, long, tender pods, in the latter case all the petals will have dropped down after setting of the pod. The unopened, shrivelling flower buds, on examination by teasing, show inside, by the side of the ovary and in between the petals a small greenish nod, which harbours a very tiny larve of the gall fly. The effect of the feeding activity of the maggot inside is so marked that the small greenish swelling in the flower grows in size day by day and as it grows, it suppresses the ovary by its side, resulting in the drying and dropping down of the ovary, and the swelling assuming the form of a roundish gall on the stalk in place of the normal fruit pod. Although one maggot prevents the formation of only one pod, the insect can make serious inroads on the seed crop when present in great numbers, as it usually is in all parts of the State. The green-manure value of pongamia is however, not impaired by the gall-fly but this insect seriously hampers seed-formation and is therefore of sufficient economic importance.

DESCRIPTION AND LIFE HISTORY

The fly which emerges in number when pongamia is in bloom (March-April) has only one generation in a year. Minute eggs are laid in the flower buds among the petals. The tiny maggot that hatches out of the egg begins to feed in between the petals and on the thalamus, where a small greenish out-growth is formed enclosing the larva within. As this outgrowth grows in size, further development of the ovary by its side is suppressed and in fact the infested flower never opens out properly and begins to shrivel. A little later, when the flowering season is just over and when uninfested flowers show



Fig. 1, Galls on Pongamia produced by the gall-fly
(*Asphondylia pongamiae*, F).

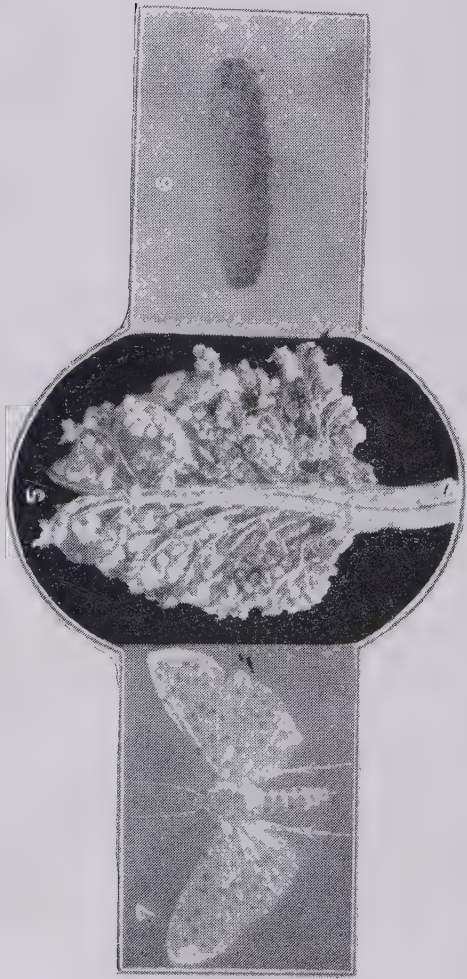
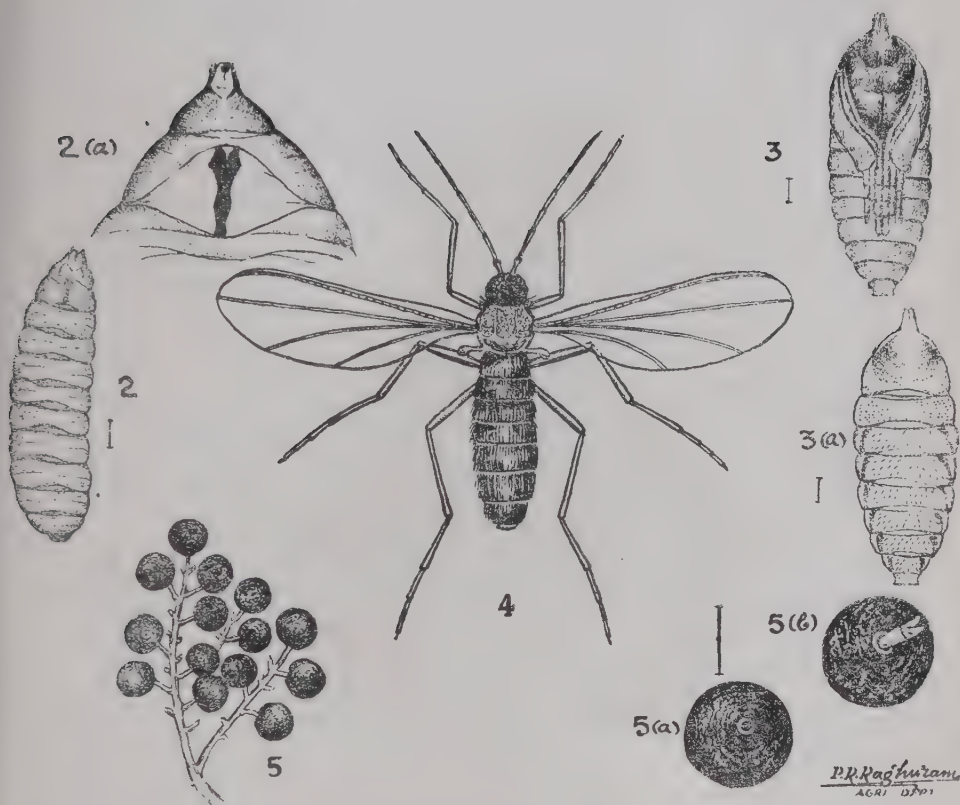


Fig. 5. Jola earhead showing damage by *Dichocrocis punctiferalis*, G.

Fig. 6. Caterpillar. Fig. 7. Moth.

Refer page 103.



Figs. 2—4. Various stages of the gall-fly (*Asphandylia pongamiae*, F).

2. Grown-up maggot; 2 (a) Anterior end of the same enlarged to show the 'breast bone'; 3. Pupa (ventral view); 3(a) Pupa (dorsal view); 4. Adult, X 13.

Fig. 5. A bunch of galls; 5 (a) A gall enlarged to show emergence hole through which a parasite has emerged; 5(b) Gall enlarged to show the emergence hole of the fly and the empty puparium sticking on to the hole.

up small, green developing normal pods, the ovary and the petals of the infested blossoms dry up and drop down, exposing a green roundish gall to which fragments of dry petals are sometimes sticking on. The gall at this stage may not be exactly round but as it grows in size, it assumes a definite round form.

Each gall lodges only one tiny, delicate fly-larva, which measures about 0.8 mm in length and 0.2 mm in width. It is bluntly rounded at the posterior end, which is the widest region of the body from where it gently tapers to the head-end, which is quite pointed. The body comprises of 12 segments in addition to head, which is quite small, triangular and retractile. Two dark oval patches are evident situated side by side on the dorsal surface at the anterior end. The body-covering is transparent through which are seen the body contents in the form of pale yellow and white patches, especially in the posterior half of the body. The larva is always found almost bathed in sap deep inside the soft and succulent tissue of the apparent hard gall. It is very inactive and does not bodily move except for the slight movement of its anterior end and protrusion and retraction of its head. As the maggot grows, it becomes thickset, elongate oval, dorsoventrally flattened and uniformly orange yellow in colour. The forked, dark brown "breast bone" which is characteristic of maggots belonging to this group of flies (Itomidae) is clearly seen on the ventral surface towards the anterior end (figs. 2 and 2 (a)). The maggot at this stage is more active unlike the earlier stages and when disturbed, it presents a sort of twitching movements. The larva is full grown by about the middle of February or early March, when it measures 3 to 4 mm. in length and about thrice longer than the width and lies in a slightly ventrally curved-up position in the larval chamber inside the gall, which at this time measures 6 to 12 mm in diameter. The larva then enters the pupal stage inside the larval chamber, usually lined with a white felt-like material. The pupa is exarate, with the appendages, viz. antennae, wing pads and legs of the future adult clearly seen externally closely pressed against the ventral aspect of the pupa. Like the grown-up larva the pupa is slightly flattened dorsoventrally and roughly elongate-oval with two characteristic spine-like blunt processes at the anterior tip (Figs. 3 and 3(a)). The pupa is at first yellow in colour finally becoming dark-brown, with a paler abdominal region, which on its dorsal surface bears very short spines. It is motile in that the abdominal region prevents twitching movements when disturbed and is capable of slight bodily movements also.

The adult fly emerges out of the gall through a neatly cut hole, through which the empty pupal skin is seen peeping out indicating that the fly has emerged out. (Fig. 5(b)). The emergence of flies in nature coincides with the flowering season of the trees. The fly is typical of the group to which it belongs and possess long and slender legs and antennae, and a pair of dusky wings (Fig. 4). It is dark brown in colour and measures about 4 mm. in length, the female having a well developed concealed ovipositor (egg-laying tube).

NATURAL ENEMIES

If the galls are examined in the month of February or early March, some of them are seen with a neatly cut pin-hole on the surface (Fig. 5(a)). The presence of such holes indicates that a small parasite responsible for killing the gall-fly larva or pupa inside the gall, has emerged out. There are more than one species of such parasite (Hymenopterous) concerned in killing the gall fly in nature. Among the parasites, mention may be made of one black small wasp (Chalcidoid), which emerges from the galls in fairly large numbers. This, in addition to other minor wasps, evidently, may be a good natural agent responsible in reducing to a considerable extent the development and emergence of the adult flies from the galls.

SUGGESTIONS FOR CONTROL

Owing to the fact that all stages of the fly, with the exception of the adult, are passed within the galls, it is rather difficult to control the insect. Removal and destruction of galls before the flies emerge from them, *i.e.*, before the middle of March will do a great deal in lessening the attack of this fly during the next year. Although this removal, can be done very easily and with little cost, does not appear to be practised. The galls may be removed easily by beating them with long poles or if the foliage is being removed for green manure purposes, galls may also be taken out with the foliage and incorporated in the manure. Usually when pods are picked from the trees, the galls are left there alone allowing for the emergence of flies and when only galls are present on the trees, they are not touched. This practice allows for the multiplication of the pest year by year. The galls have to be removed invariably from the trees before the middle of March to ensure the death of the flies in the galls. Evidently, this operation of removal and destruction of galls has to be attended to on a co-operative and collective basis, all the trees in an area being promptly looked after, as there is every possibility of flies emerging from a galled tree in the neighbourhood attacking flowers of other trees from which galls have been promptly removed.

An effective control of the ovipositing (egg-laying) adults may also be obtained by spraying the flower spikes with D.D.T.* in water. One lb. of the insecticide should be mixed with 16 gallons of water and the first spray given just when the earliest flower buds are formed on the spikes and the subsequent sprays at an interval of 3 weeks till no more flower buds are put up on the tree. Normally two sprays may be enough for one season.

The drawings and photograph were made by Mr. P. R. Raghuram, Artist of the Department.

* D.D.T. 550, a Geigy product, supplied by Messrs. The Geigy Insecticides Ltd., Ballard Estate, Bombay, or DeDetane (20% spray powder), a product of The Murphy Chemical Co. Ltd., England, supplied by Messrs. The Bombay Co. Ltd., Broadway, Madras may be used).

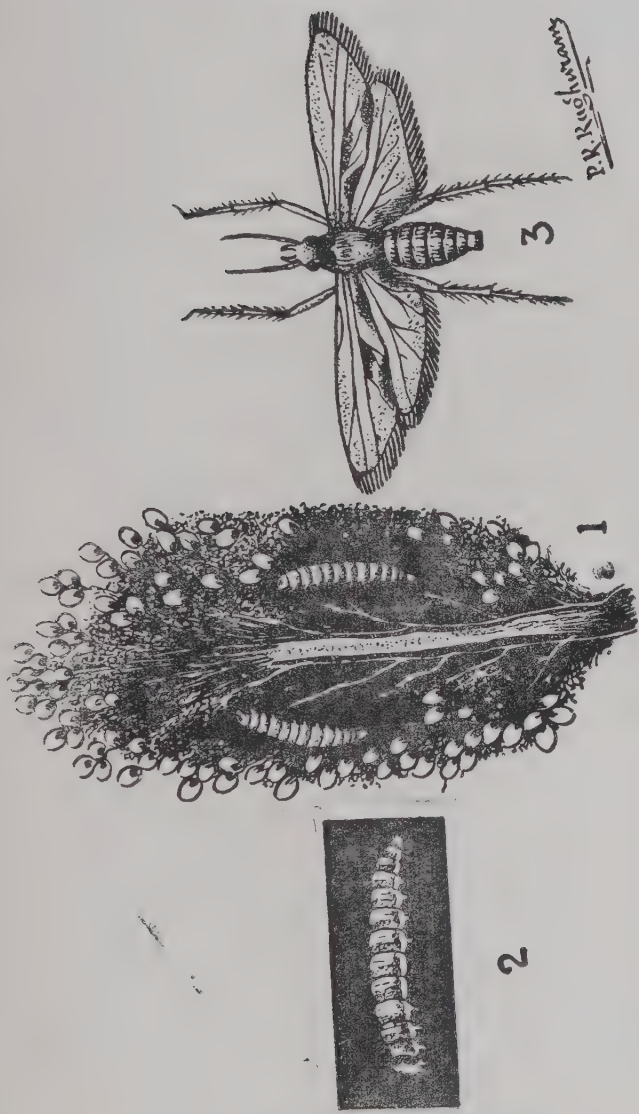
WEBBING CATERPILLARS ON JOLA AND RAGI IN MYSORE AND THEIR CONTROL

BY DR. M. PUTTARUDRIAH, B.Sc. (Hons.), M.S.; Ph.D. (Calif.)

Jola and Ragi form the staple cereal food crops in Mysore. These two cereals constitute the major diet of the majority of the population, particularly the cultivator and the labour classes. Under grow more food campaign, the area under these two crops is being largely increased. To make the grow more food campaign a successful measure in attaining the self-sufficiency in respect of food, these two cereal crops have to be protected from the ravages of insect pests.

Of the several insect pests on Jola in Mysore District, the common earhead webbing caterpillar-*Stenochroia elongella* Hampson, has been found to be very serious.

The adult insect is a moth of fairly big size, dry straw colour with long narrow wings, and is remarkable for its great death-feigning habit. During daytime the wings are rolled over the body, and the moth remains stationary on the earhead in perfect harmony with the environment. If disturbed, it drops to the bottom and remains absolutely motionless until pricked by a needle. It begins its activity after dusk; and lives fairly long.



P. K. Roghayan

Fig. 1. Jola earhead showing damage by *Stenochrois elongella*, H. Fig. 2. Caterpillar.
Fig. 3. Moti.

The actual damage is done by the caterpillars, which come out of the eggs laid by the adult female. They are dark brown in colour, with whitish stripes on the body. They cut the hardened grains and construct webbing with frass and powdered grains. They pupate within in the webbing. The pest multiplies within the stack, if the harvested crop is already infected. Damage on the earhead can be made out from figure 1. Figures 2 and 3 are the caterpillar and moth.

This pest along with two other minor webbing caterpillars have been observed to cause great damage on Jola in Mysore District, if allowed unchecked within the stacks.

In 1949, this insect was noted on Ragi in Mandya District for the first time.

In 1950, it broke out in a pest form on "kar" Ragi, grown extensively in Mysore, Hassan and Mandya Districts. As Jola was somewhat of a failure in Mysore District, the pest could conveniently take to Ragi earheads and easily spread to the crop in the contiguous districts. Figure 4 shows damaged Ragi earheads from the stack.

The pest was further able to spread from "kar" Ragi to the "hein" Ragi stacks in the areas as the latter was in earheads by the time the stacks of the former were threshed. Conditions obtaining in Mysore District are found to be very favourable for the continuous spread of the pest, as premonsoon Jola (Mungar), "kar" Ragi, "hein" Ragi and post monsoon (bbini) Jola are grown, one after the other, the earheads of all the crops affording suitable conditions for the multiplication of the insect, and thus necessitating a careful watchout for the pest, and treatment of the crop, the moment incidence is noticed.

In addition to the usual webbing caterpillars, the castor pod borer—*Dichocrocis punctiferalis* Guenee, has been recently found to infect Jola earheads and damage the grains in the same way.

The parent of this pest is a short, medium sized moth, with bright yellow wings with black round spots. The female can be distinguished from the male by the black tip of its abdomen. It is very active and easily seen.

The caterpillar is stout, pinkish or reddish brown in colour, with flattened horny warts from which arise short bristly hairs. The head is brown. It cuts the hardened grains in the earheads and webs with frass and grain pieces. Pupation takes place in a silken cocoon in the webbing.

This may turn out to be a serious pest as it has a wide range of host plants, and varied habits of feeding, in being a stem and pod borer; and also feeds on flowers and fruits of other hosts like cardamom, castor, sunflower, mango flower, peaches and guava fruits. Its damage on Jola earheads can be made out from figure 5. The caterpillar and moth are shown in figures 6 and 7.

It is possible that this insect may extend its depredations on Jola in the fields, from infected castor pods on perennial castor plants grown in village backyards, in which case the damage would be much more serious.

CONTROL MEASURES

The webbing caterpillar can be successfully controlled by dusting Hexyclan or Gammexane mixed with fine wood ash in the ratio of 1:4 on the earheads of standing crop; or immediately after harvest before stacking. The dusting must be thorough and the powder must get into the earheads. In the absence of rotary or power dusters, simple devices can be made. The powder can be put in the simple basket duster devised previously in connection with the dusting of Jola earheads against the sucking bug, or in pieces of

gunny cloth of suitable sizes, and dusted on the earheads. For effective dusting small bundles of Ragi and Jola must be held straight and the earheads spread while the chemical is being dusted uniformly into all the earheads. Two men can conveniently carry out this operation.

The pest was effectively brought under control in Mysore District, during 1950, by resorting to dusting of Hexyclan in time, before the insect could multiply. 1062½ lbs. of Gammexane and 2593 lbs. of Hexyclan were distributed free of cost in Mysore District, to the cultivators for treating their crops, after holding dusting demonstrations in most of the places.

Another easy and convenient measure of control would be to thresh the stacks as early as possible without allowing them to remain till the conventional time of a month or two. This measure must be particularly resorted to, if infection is noticed even on a mild scale on the standing crop. It will facilitate killing of the caterpillars and pupae; and also getting the full benefit from the crop. If the stacks are allowed to remain without being threshed or treated with Hexyclan or Gammexane the pest will multiply and damage all the earheads.

During the recent outbreak of the pest, the possibilities of fumigating the stacks were explored. "Killoptera" as a fumigant on small stacks fully and tightly covered with a thick tarpaulin gave a good kill of the caterpillars when used at the rate of 24 lbs. per 1000 c.ft. and exposed for 48 hours. However as a routine operation for large scale fumigation in all the areas, it could not be recommended as it was fraught with several practical difficulties, viz., supply of a large number of suitable tarpaulins to the cultivators for covering big stacks of various sizes; the high cost of the fumigant and long duration of exposure necessary for effective results.

Against the castor pod borer which is a potential economic pest of Jola and Ragi earheads, a preventive measure can be suggested. The pest is likely to spread from infected pods on perennial castor plants in village backyards, into the field crops. So it is necessary to examine the castor plants in the backyards and other places more often, and destroy all the infected pods by burning.

The drawings and photographs were made by Mr. P. R. Raghuram, the Departmental Artist.

INSTRUCTION IN AGRICULTURE IN MIDDLE AND HIGH SCHOOLS

BY K. SUBBA RAO

Senior Agricultural Inspector of Schools.

To give an Agricultural Bias to the boys reading in the Middle School, the subject has been introduced in some Middle Schools as one of the optionals. The subject has been introduced as long back as 20 years, and even earlier in a few institutions. The response has been quite good in majority of schools, and it is desirable that many more schools should have this subject as the optional, if it is not possible to make it a compulsory one just for the present.

There are vernacular schools of Agriculture run by the Department extending for a period of one year, where only Agriculture along with a few other allied subjects are taught just to make them fit to take up active field service in the Department,

But the subject which is taught in the Middle School, is not so intensive, as the students have to learn the other general subjects. As mentioned above the subject is taught more as a Bias, so that they may pursue the same in the higher classes. Unfortunately the subject has not been introduced in the High Schools. A good beginning has been made in one of the private Institutions at Goribidnur which is making very good progress.

The Government have already kindly considered the question and it is contemplated to introduce the subject in some High Schools. It is under the kind consideration of the Government to introduce the subject in some more Middle Schools also. For the present there are 24 institutions among the Middle Schools, where the subject is introduced.

For the increase of the schools with Agriculture as the optional, the co-operation of the local public is very greatly required. As it is not possible to have the land always by acquisition, the generous public should kindly make up their mind to lend their co-operation by way of donating at least the minimum area of land required for the practical work of the students. For want of suitable lands it has not been possible in many places to introduce the subject. It is needless to say that a practical subject like Agriculture cannot be taught only in the class room, and more of practical work is needed, which cannot be done unless there is land available near the school. As the young boys cannot afford to go far, for the practical work, as they have limited hours for the same, and also much time will be wasted in walking up and down. The acquisition will not be possible either on account of the high value of the land or other causes which hinder the progress.

The co-operation of the parents will solve this problem to a great extent which should be kindly considered by them.

It is with great pleasure that we have to say the students take a keen interest in the work and in many institutions, co-education is being given. Girl candidates are evincing great interest in this subject, and taking part in the practical work with great willingness. There is the other side of the question also inasmuch as some parents feel, that it is not necessary for their daughters to take up Agriculture and instead they may be taught Hygiene or any other subject. In a country like ours, where Agriculture is the main occupation, it is very necessary, the subject is studied by all as it will be useful in their daily life one way or the other.

LIFT IRRIGATION IN TUMKUR DISTRICT

BY H. C. NANJIAH & G. RANGASWAMY IYENGAR

Introduction :—In nature, certain tracts are divinely endowed with perennial rivers, or timely supply of good monsoon showers, or both, while other tracts enjoy bountiful perennial springs (Thalapariges) or seasonal springs (Bugge) or both, in places where the country presents a dry, wild, and waterless appearance. Drought periods, or famine-stricken conditions are not uncommon to meet with, once in 10-12 years in such tracts. One such tract having uncertain monsoon rains and the consequent dry and hot weather climate, comprises of the taluks of Koratagere, Madhugiri, Pavagada and Sira in Tumkur District.

Rainfall :—The average rainfall in recent years in this tract varies from 16.70 inches to 21.70 inches as per statement appended. There are some parts also of Mudhugiri and Pavagada where annual rainfall is even less than 12 inches. All these clearly point out to a dry hot zone, in no comparison to good rainfall belt of not less than 30 inches of rainfall, on an average, annually.

RAINFALL TABLE

<i>Taluk</i>	<i>Average rainfall</i>
1. Koratagere	18 inches 38 cents
2. Madhugiri	21 „ 27 „
3. Pavagada	21 „ 07 „
4. Sira	16 „ 70 „

Sources of Irrigation :—The striking feature that one comes across during his rounds, is the predominating factor of irrigation through wells, all the year round, as seen from the table given. In addition to this primary source of irrigation, a large number of tanks, both major and minor in kind, does exist, more as a net work, along with two or three rivers and a number of rivulets (ತೊರೆ Thore). Except for a few tanks, which are sufficiently deep, and which get filled during normal years, all the others go nearly dry, or entirely dry, when wells are dug therein, mainly for drinking purposes and sparingly for irrigation, when feasible. The rivers also flow in floods during years of good rainfall. At all other times they go dry or nearly dry, presenting a dry, hot, sandy bed, and in some places, a bare, rugged, rocky appearance. The rivulets also cease to exist. In these sandy river courses seasonal and perennial springs (Thalapariges) are found and made use of, for drinking and other purposes, as well as for irrigation through shallow wells, or pits, and channels.

Soils :—The soils met with under irrigation in this tract are mostly of sandy loam type, and partly of ordinary loam type. In a few places, gravelly and clayey types are also come across along with alkaline and marshy patches, here and there. One particular feature of the loamy soils, which are popularly known as the best old paddy lands, is their peculiar dark colour, on account of the continuous age-long practice of heavy green manuring, chiefly with honney leaf, and the consequent humus content thereof. But for this particular phase, especially under wells in this district, considerable paddy yield of 20-25 pallas of grains per acre, more so during the summer season, could not have been commonly reaped.

Irrigation :—The main source of never-failing irrigation, as described above, is only through wells and Thalapariges and channels. Wells are sufficiently deep and vary in their capacity to irrigate daily from one to three acres. These are worked by *mholes*, or *kapiles* (bullock-lifts) drawn by two to three pairs of good hardworking bullocks, alternately. In recent years, enterprising ryots have also installed Persian wheels, oil engines and also taken the invaluable electric power, to irrigate through pumps and channels and raise good crops, mitigating the labour, bullock, and other difficulties. Thalapariges vary in their depth, some so shallow as to take water through channels for irrigation, and some deep enough as to form into wells, worked by *kapile* for irrigation.

Seasons :—Two main seasons are chiefly observed in practice for raising crops, one, the summer (Vaishaka) and the other rainy season (Karthika). In both the seasons, the irrigated lands are cropped without fail. Only in some parts, in between the two seasons, crops are also raised of a short duration, amounting to three crops in a year.

Crops :—Two main staple food crops, viz., paddy and ragi occupy invariably the irrigated area to a large extent, during both the seasons, paddy mostly during summer, and ragi mostly during the rainy season, as per table given. In normal years paddy and ragi are raised so considerably as to transport the excess quantities over their local requirements to the nearest market. Thus shines this tract, being a surplus area. Once a way, when rain-less drought periods persist, and continue, quite a different, heart-rending

picture presents itself, and new complicated problems crop up, as experienced recently, converting the tract dry and barren, along with nearly drying up medium and shallow wells, and seasonal springs and also decreased Thalapariges, when people have to depend mostly for their food on the outside supply, the tract being classified under famine area.

Rotation:—Though generally ragi takes the place of previous crop of paddy during the Karthika season (rainy season), yet, other crops are also grown in rotation with paddy and ragi. They are *jola*, sugarcane, *navane*, onions, fenugreek (ಮೆಂತ್ಯ), coriander (ಕೊತ್ತಂಬರಿ), chillies and tobacco. Systematically, no order is rigidly followed. Usually, in each year, food crops occupy a very large area, having paddy mostly during summer, and ragi mostly during the rainy season. Jola is grown both for grain and fodder, to a small extent. Other crops, viz., the money crops of sugarcane and chillies are commonly grown invariably on a small scale, in each holding, while in some parts, tobacco, *navane*, onions, fenugreek and coriander are also included in the rotation to a little extent.

Cultivation:—The major crops of paddy and ragi are cultivated, similar to the other reputed areas. In general, the paddy crop receives without fail, the basic dose of cattle manure before paddy transplanting takes place in well puddled soils, applied with plenty of green Honkey leaf, transported by cart-loads either nearby or even from long distances of 5-10 miles. It is this chief factor of providing humus content to the soils, invariably, as a well laid, age-long practice, that is mainly and directly responsible for good crops and heavy yields. In addition, of late, ryot-growers have also resorted to the application of cakes like groundnut cake, honkey cake, neem cake, castor cake, and bonemeal, and fertilisers, as suggested by the department. To a small scale, sprouted paddy is also broadcasted. In the case of ragi, only transplanting is resorted to. All the care that is necessary is bestowed in preparing seed beds, manuring same with cattle or sheep dung, sowing selected good seeds and raising vigorous seedlings. Then, economic transplanting is taken up, by twos or threes in well-manured lands, kept ready. It may not be out of place to mention that "Halubbalu" is the common variety of paddy grown along with Konankombu ragi which one commonly comes across. In recent years, Bhangarakaddi (S.705) paddy is also grown considerably; other varieties of paddy grown include Bhangarathige, Kapile sanna, and other local varieties to a small extent and Coimbatore sanna (S. 634 and S. 661) and Bile Bhatha to a considerable extent. Other varieties of ragi, put in are usually of short duration, and raised in between the two seasons as *kar ragi* (sown in April-May) and *Yedagar ragi* (sown in September-October. ಕೆಂಪರಾಗಿ or ಸಸಿರಾಗಿ).

Observation:—Particularly striking features of irrigation under wells, as compared to those under tanks, rivers, etc., are follows. (1) The area covered by a ryot raising crops under wells is very much limited and hence receives all his personal attention, with regard to each and every detail of cultivation of any crop in respect of seeds, tillage, manuring, cultivation, and after harvesting and reaping. (2) He is the master for himself and his resources, and need on no account enter into disputes, quarrels, etc., with his neighbours, resulting in waste of his precious time and valuable labour with the consequent personal risks of life and property. (3) Water is very precious to him, as every unit of it lifted up, costs him considerably utilising labour, and bullock power. Hence, he uses water very economically, so as to meet the bare necessities of water requirements of crops and gets the maximum crop returns at minimum cost. Thus the ryot knows the trick of the trade. (4)

Irrigation is not practised as under tanks or rivers so profusely as to even submerge the seedlings, sometimes under water, leading from the top flat above, to the last bottom low lying plot below. This latter practice means draining from plot to plot not only the water, but also the possibility of draining the manurial content, in the name of irrigation, with the often-seen stunted growths, and poor yields, in richly manured plots, while the ordinary manured check plots produce good growths and rich harvests. Unlike this under wells plot by plot is irrigated individually once in 2 or 3 days according to season at a minimum with the result that soil-aeration is kept up, good growths are encouraged and maximum yields are ensured, in that the soil fertility, and condition are in no way lost. (5) Thus, by the above system, the scope for the water to save as a contaminating source of either pest, or disease, is very much restricted, and the disease or the pest, if any, can conveniently be brought under-check very soon in view of small size. (6) There is little opportunity under wells for the water to stagnate continuously anywhere so as to close all the soil pores, and prevent soil aeration for retarding the plant growths, as well as encourage marshy growths (*pachi*) particularly in the low lying parts, and also sometimes convert good fertile plots into alkaline patches.

Conclusion.—In brief, it is made clear how and what prominent part the wells play in the production of food and money crops for the good of mankind, decidedly in the best interests of the ryot grower of this tract. Consequently, the traditional bullock lifts, the newly introduced Oil engines or the bullock driven Persian wheels, or, as the bountiful nature, has blessed Mysore, the invaluable electric power in the modern sense of current affairs, assume the corresponding prominent role, as a dire necessity in their daily affairs. Further there is vast scope to instal electric power and pumps on a wide scale, to facilitate lifting water easily at a nominal cost for increasing the crop production of this tract, to its maximum extent, availing of all the necessary materials on hand, and liberating the hardworking ryot grower to a large extent from almost his daily troubles of extraordinary bullock and other labour and cumbersome appliances, enabling him to improve himself and his people, materially, for the good of the country.

LIFT IRRIGATION IN TUMKUR DISTRICT

Statement showing the average Rainfall, Acreage served by lift irrigation, etc.

Particulars	Koratagere Taluk	Madhugiri Taluk	Pavagada Taluk	Sira Taluk	Remarks
	Inches Cents	Inches Cents	Inches Cents	Inches Cents	
1. Average rainfall (5 years average)	18—36 A. G.	21—27 A. G.	21—7 A. G.	16—70 A. G.	
2. Area under summer paddy (average)	2666—7	2937—8	1783—0	3258—0	
3. Area under Monsoon paddy	2070—6	2063—8	474—0	2161—0	
4. Area under tanks	7432—11	2387—32	450—0	2161—0	
5. Area under <i>kāpile</i> wells	1264—1	1809—16	1607—0	3258—0	
6. Area under Thalapariges, river channels and other sources.	4210—0 Summer	612—8 Summer	... Summer	... Summer	As noted in the previous column
7. Local and improved varieties of paddy.	Halubbalu, Bhangarkaddi, Bhangarthiga. Rainy season Coimbatore sanna, Rathnahooadi & Halubbalu.	Halubbalu, Bhangarkaddi, Bhangarthiga. Rainy season Coimbatore sanna, Rathnahooadi & Halubbalu.	As in Madhugiri Taluk Rainy season As in Madhugiri Taluk	Do for rainy season.	

A SCHEME FOR THE SUPPLY OF PURE AND CHEAP MILK

By H. C. BASAVALINGAIAH, L.Ag., I.D.D.

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The objects of Co-operative Milk Supply Societies are manifold. The supply of genuine milk to children in particular and adults in general is one of the duties of such Societies to produce strength and vigour in the rising generation. It is a well known fact that milk is essential for men as it contains all the ingredients recommended by the scientific research for human growth. But little was known about the economics of production and distribution of milk beyond the fact that its inadequate supply had been a serious menace to the health of the people. The milk trade was not organised and milkmen were ignorant. The ignorance of milkmen and high cost of fodder and concentrates of cattle feed rendered the trade uneconomic. The production and consumption too were inadequate, the per capita average in the Madras State was only 3.8 ozs. per diem as against 22.7 ozs. in Delhi. The Government of Madras decided to make the Dairy industry a remunerative one similar to the conditions prevailing in other leading countries of the world and hence wanted to group all milkmen together on Co-operative basis. The Government also wanted to form a Milk Marketing Board to look after the interests of the milkmen, to undertake the collection of milk produced, to distribute it after processing, to make it free from harmful bacteria so as to be fit for consumption according to priorities drawn and prices fixed by the Government or the Board.

With the above objects the Government of Madras launched the Urban Milk Supply Scheme in the State making provision for special trained staff in Dairying.

The scheme visualises both a short-term and a long-term programme comprising the following :—

- (1) Starting of Co-operative Milk Supply Feeder Societies in villages and affiliating them to the Unions.
- (2) Starting of Co-operative Milk Supply Unions in towns and cities.
- (3) Starting of Co-operative Cattle Breeding Societies.
- (4) Starting of Co-operative Cattle Marketing Societies.
- (5) Starting of Co-operative Dry Stock Farms for the salvage of dry animals.
- (6) Supply of Pedigree Bulls to improve the breed of the animals by adopting a systematic Breeding policy.
- (7) Establishment of Co-operative District Fodder Committees to explore the possibilities of fodder production on cultivable waste lands.
- (8) Subsidising private dairy industries in rural areas on co-operative basis.
- (9) Easy supply of cattle food at cheap and controlled rates on co-operative basis.
- (10) Encouragement of mixed farming on small holdings and Dairying in Bungalows and houses with big compounds.
- (11) Giving free technical advice on breeding, feeding and management of live stock, production, handling and distribution of milk and milk products by propaganda through magic lanterns.
- (12) Advancing interest free Government loans and subsidies to members of Milk Supply Co-operative Feeder Societies for the purchase of milch animals.

In the interest of better nourishment and health of the nation it is imperative to increase the production of milk and make it available at lower prices for the majority of the population. Both production and distribution should be made more economic. Co-operative organisations had been found to be a suitable agency for this purpose. The Madras Co-operative Milk Supply Union Ltd. started in Madras City in 1927 had made steady progress and now had 80 Feeder Societies and other individual members. The union is now having its own buildings at Ayanavaram. A plant for pasteurisation of milk has been erected by the union. The members are paid money for buying cattle feed. The Union also supplies cattle feed to members. Encouraged by the successful working of the Union organisations of similar kind have been formed throughout the Province and their number has increased from 103 in 1940 to 478 in 1949. Sixty-six Municipalities and 76 major Panchayats are at present served by such organisations. The Urban Milk Supply Scheme sanctioned by the Government of Madras was put into operation and it has now extended to the entire State.

The co-operative organisation is mainly an institution of producers the bulk of whom are illiterates. To help and guide these illiterate non-milkmen are admitted as members. All engaged in milking profession are eligible for membership in the Societies irrespective of caste, creed, or religion. A suitable place is selected for the society. A large number of milkmen and women are admitted. They need take only one share and pay a nominal value of Rs. 5 per share either in lump or five monthly instalments. The admission in the Society entitles the members to milk their milch animals in the common milking yard of the Society. They are required to keep their animals clean. Milking is done in the Society's milking shed under hygienic conditions observing all the clean milk production principles under the immediate presence of the Staff of the Society in the early hours in the mornings and evenings. The milk drawn is measured individually and handed to the Society and the quantity is entered in the respective Pass Books of members. The milk thus pooled is despatched in sealed cans to consumers through milk vendors for door to door delivery. The process of thus pooling the milk gives a uniform percentage of the constituents in the milk derived from various animals. The consuming public are thus supplied with unadulterated pure milk at their very doors at a reasonable price. The smallest quantity sold is 1/16th (M. M.) Madras Measure. As a rule milk is sold for cash only; generally coupon system has been introduced in all the Societies. By this method consumers are required to purchase coupons of 1/16th, 1/8th, 1/4th, 1/2 and 1 M.M. paying the full value in each case.

To lift up these small but beneficial institutions Government are giving all possible facilities including interest free loans, repayable in 10 monthly instalments for the purchase of milch animals, fodder and concentrates of cattle feed.

The Society charges a small margin of profit on the cost price. Since these Societies are producer concerns, they are given more representations on the Board of Management to safeguard their interests.

These institutions are intended to serve the public at large. They are increasing from day to day. The public find it more reliable than private individuals. In all places where the Societies have been started the demand for milk is always greater than the supply. This signifies the popularity and usefulness of these institutions. Of late more milk supply co-operatives are demanded by the people, the producers and consumers even in villages. In the Madras State many such societies organised for the benefit of ex-tappers under ameliorative Scheme are now working and their progress is satisfactory.

The Union purchases milk from producers at certain rates according to local conditions. In respect of Feeder Societies and individually managed centres the Union pays a commission of $1\frac{1}{2}$ annas to 2 annas per rupee of milk supply while in the cases of centres under the Union management, no commission is paid as the entire expenses in running the centres are borne by the Union.

The Union sells milk through cycle vendors, Milk Depots, and Milk Depots *cum* Milk Bars. The Union sells milk by coupon system charging annas four per month extra for house delivery. Some public institutions, viz., Spencers, Vincents, Municipal Health centres, Hotels, Hostels, Child welfare centres, Sanatorium and Refreshment rooms form the largest customers of these Unions. Whenever there is surplus of milk it is converted into byproducts like curd, butter, Khoa, lassi, etc. and sold.

There are Checking Inspectors in the Union who pay surprise visits to the milking yards during milking time, check the vendors during distribution and examine the seal and quality of milk. The President and Secretary of the Union also pay surprise visits to the centres during milking time and check the distribution of milk by vendors to ensure prompt and correct supply to customers.

For quicker transport of milk in greater quantities some Unions have purchased Motor vans. The Unions supply both buffaloes and cows milk to the residents. Purity and regularity of supply has been appreciated by the public.

Technical aspect in the working of the institutions:—Conservation and preservation of milk is very important. Since the life of marketable milk depends upon the activity of the micro-organisms influenced by climatic conditions, it is essential that the production and handling of milk at all stages should be carried out under hygienic conditions under a technique, which will either eliminate or retard the growth of bacteria. For reasonably efficient working the following procedure is being practiced.

At the Feeder Society:—1. Each Feeder Society has been provided with a common milking byre with an attached milk room and a clean well-water supply.

2. Under the supervision of a trained responsible member of the Feeder Society the animals will be prepared according to the prescribed methods and milk drawn under sanitary conditions at the scheduled timings in the morning and evening and the individual member producers milk recorded, bulked in haulage cans and despatched to the Union by head-load or by cycle whichever is convenient.

3. After despatch of milk the milking byre will be washed and cleaned. Similarly all utensils used for milk production will be thoroughly cleaned and finally sterilised by rinsing with 0.05 per cent bleaching powder solution.

The collection of milk from different Producers' Societies can be completed within two hours of production. The milk received from individual Producers' Society will be weighed and judged for acceptance. Then the milk is passed through a strainer to the bulking tank. The testing of individual lot for fat and bacteriological quality will be done simultaneously. The bulked milk is then passed over a surface tubular cooler to chill below 50° F. and kept in cold storage until distribution.

At the Union Office all necessary records and registers in regard to receipt, sale and accounts at all stages of handling milk will be maintained.

Processing of milk to control and remove disease germs in milk will certainly contribute a great deal to eradicate dreadful diseases in our country. To achieve this, on the advice of the technical experts, the Government advances loans for purchasing pasteurisation and cold storage plants.

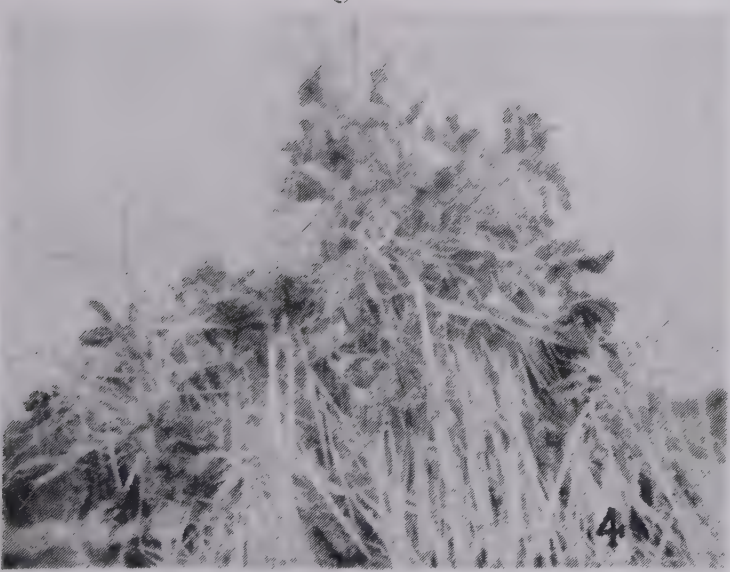


Fig. 4. Ragi earheads from stack showing damage by
Stenochroia elongella, H.

Refer page 102.

Face Page 113.



Bulb fields at Lisee

Some Unions have also undertaken additional activities like salvage of dry cattle, cultivation of fodder by the use of town sewage, maintenance of good Stud Bulls, etc. To create healthy competition among the Feeder Societies, the Unions institute prizes to be given to that Feeder Society which supplies the highest quantity of milk. In order to see that the milch animals are kept well, the Unions are giving prizes for the best kept cow in all the Feeder Societies and Centres. Some Unions have gone a step further and are conducting Milk Recording Schemes which aid in cutting out the poor milkers and encouraging the good milkers on scientific feeding and systematic breeding principles.

The Government of Madras are collecting sales tax on the sale of milk at the rate of three pies per rupee. The Government of India are paying 50 per cent subsidy to the Government of Madras towards the working of the Scheme.

In Mysore State also there is great scope to improve the Dairy Industry and to develop the cattle wealth by launching such schemes under the auspices of the Government of Mysore. The Scheme can be implemented and worked out successfully on the lines indicated above with reference to the working of the Scheme by the Government of Madras.

HOLLAND, THE LAND OF HORTICULTURAL INDUSTRY

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Holland, literally, is the land of horticultural industry. In its 3,32,069 acres under horticultural crops, the cultivation is very intense and carried out on an industrial basis with all zeal and national interest. The skilled growers, who follow the up-to-date methods of cultivation, loving the soil, bring forth from the good soil all that the earth could yield and make the earth "blossom as the rose." The Government machinery spares no pain to enlighten the growers with the advancing and advantageous methods of recent cultivations and laboratory findings. The Government is aware that it is of vital importance that the soil of country should be utilised as intensively as possible to provide food for the population and goods for export. Therefore, the net work of the advisory personnel and their institutes with trial and demonstrative fields, covers the whole country and all aspects and all branches of horticulture; and it brings the Government and the ordinary growers directly into close contact. The growers, through this advisory machinery which comprises informative, instructive and demonstrative aspects of scientific horticulture, gets the laboratory findings and recent discovery of horticultural sciences, in simple and applicable forms in the field. Every scientist knows that the acid test for any laboratory findings, is the field method test. These institutions with demonstrations of the advanced cultivation of horticultural plants, in its applicable form in the fields, with schools, trial fields, and experimental farms amidst the growers and in the growing centres, are most effective; and mainly, if not wholly, the high standard of quality and high yield of horticultural products in Netherlands, may be attributed to this aspect of Government work. The mass of the growers, thus, are not far removed from the knowledge or findings of the great scientists in the scientific institutes, research stations and laboratories. It is heartening to learn that all the experimental stations, in different parts of the country, being maintained by the growers by voluntary contribution (over and above 50% to 80% of the maintenance of

the experimental stations being contributed by the growers and the rest by the Government in subsidiary form), wherein they hand over their day-to-day problems to be tackled. And such, through this advisory personnel and through extensive experimental work, it has become possible to grow plants in a far more certain and rational way.

There is much of interest to be seen in this flat country with humid climate, with large rivers, canals, ditches and with wide range of soil—silt, sandy-silt, peat, fenland, fen mixed with sand, sandy soil, reclaimed peat soil mixed with sand and loam. It is a first rate experience in this water-dissected flat-land that floweth with flowers, vegetables, fruits and nursery stocks. The story of Holland's horticultural development is fascinating, fascinating because of the enormous amount of work that has gone into the making of productive soil from the shallow sea that was before. This reclamation is not yet at an end, for huge shallow fresh-water sea areas are still being drained and put under cultivation. Some of the clayey soils have been considerably improved by the application of gypsum salts (Zeeland). Powerful pumping stations, long dykes, wind-mills can be seen draining the land and pumping the water to sea. So nature's conquest of fertile peat and sandy bottoms of sea, proceeds.

My first impression of horticultural industry in Holland is that of its intensity, cleanliness, organisation, education and its industrial appearance—with enormous areas under glass, the chimneys of the heating-houses, the grape houses, the dutch glass houses (tomato), the cucumber houses, the flat-dutch ventilators, all these give the land an industrial appearance.

The development of horticulture has begun since 1912 and considerably expanded during the first war and afterwards. A striking feature of the Dutch horticulture, is its division and intensive development of each line without neglecting any of them. Now the following branches have grown into highly developed units:—

- (a) Market gardening
- (b) Fruit growing
- (c) Bulb growing
- (d) Seed-culture
- (e) Floriculture and decorative pot-plant culture (Nursery)
- (f) Arboriculture (Tree-Nursery)
- (g) Marketing organisations
- (h) Horticultural education
- (i) Experimental and trial stations, etc., etc.

The west-land is the centre for fruits and vegetables. The extensive use of glass, glass-frames on hot-beds, glass-houses for tomato, and cucumbers, glass-vineries and ware-houses, give the west land the appearance of a factory area. The water-ways crowded with barges with loads of vegetables and fruits, from fields to the auction sale-society is a fascinating sight to be seen. The principal fruits grown under glass are grapes, peaches, and plums, and the vegetables are tomatoes, and cucumbers. Besides these fruits under glass, the fruit growing in the open is also very extensive and intensive. Zeeland is noted for its quality of fruits—apple, pears and plums. South and North Holland also grow fruits—the important fruits are apples, pears, plums and cherries. In many of the orchards, the soft fruits like red, white, and black-currants, gooseberries, and raspberries form the under-cropping. Strawberry is also one of the important soft fruits grown for export and home consumption.



Cross cut hyacinths bulbs in their growth.



Hall with cut flower in the auction of Aalsmen

The district between Den Haag and Haarlem, a long stretch of sand dunes coastal area, is the main centre and the picturesque bulb-growing area. Tulips, hyacinths, daffodils, narcissi, crocus and gladiolus, are the principal bulbs. Bulb-lifting, storing, wintering, preparing for forcing and retarding and hyacinth multiplication are all of much interest.

Aalsmeer is the most important centre for cut flowers and plot-plants. The principal flowers grown for marketing are roses, lilacs, prunes, carnations, chrysanthemums, lathyrus, freesias, dahlias, iris, lilies, stocks, statice, and asparagus; and pot plants are begonias, hortensias, cyclamens, primulas, pelargonium, cinerarias, coleus, hydrangeas, azalias, fuschias, kalanchoe, and ferns; annuals like dahlias and marigold, etc. There are over 1,000 nurseries in Aalsmeer and about 2,500 acres under flower, out of which 40 per cent is under glass. Cyclamen seed production is one of the important items in nursery. 1,000 seeds cost about 25 golden (about Rs. 30) at present. The cut flowers and the pot plants are auctioned in the auction-sale society every day.

Each grower has his own holdings, operates with his own equipments, grows, and grades his production according to Government regulation and sells it in the growers' auction-sale society, of which he is a member. Under this system, the growers are organised into a co-operative society—in each growing area, at several convenient places, society for fruits, vegetables, cut-flowers, pot plants, etc.—which handles auction-sale. The auction-sale is conducted everyday, or alternate day or once or twice a week, as the case may be. The society supplies the containers to the growers to bring their produce; the Society Inspector inspects the grades and quality of produce of each grower before they are brought into the auction hall. The grades, quality and kinds all are entered in the grower's sheet. The auction conduction is interesting:—An auction-clock, electrically operated, is installed on a raised platform, with sufficient space, in front of it, for auction conductors to sit and conduct the auction and to operate the clock. Just below the platform is a channel or passage with inlet and outlet to bring the produce for auction. The bidders seats are quite opposite the clock; each seat with a number and a switch converted with the corresponding numbers in the centre of the clock. The handle moves round and round the arrow-point of the handle pointing the numerical figures which represent the money value. The auction-conductor announces the name of the grower, the kinds, the grades, from the grower's sheet and releases the handle (and by the time the grower is ready to show the produce in the passage) which begins to move from figures to figures—from higher value downwards. The bidders, exporters, retailers, and home-market-dealers—press the button according to their estimation; and whoever quick and first to press, gets the produce and when he presses the switch, the handle stops at the figure it was just about to pass and in the centre, the number of the bidder appears. The assistant to the auction-conductor records the price and the number of the bidder in the grower's sheet; then the sheet goes to the book-keeping office for collection of the amount. The collection of the money and book-keeping is done by the society. The growers are paid every day or once in a week. $2\frac{1}{2}$ per cent of the realisation goes to the society of which each grower is a partner.

The society provides go-downs, packing-hall and other facilities at small charges to the bidders. The bidders have to get their own trucks and packing materials. They immediately take charge of the auctioned produce from the growers and the grower is free immediately after the auction of his produce is over; and the office gives him a copy of the sheet in which the total amount is noted for his own use. This system of auction is of immense use to the growers and particularly for those with small holdings as that of our country.

So, the society consists of growers and formed by the growers. It was started about 60 years back and now it is well organised and well developed. It is the best system as far as the small holders are concerned. Holland growers, as in the core of our State, are all small-holders, in acreage from 2 to 3 acres. In such small holdings and the family entirely depending on the earnings of the land, the grower depends mainly on the buyers of their produce. Before this auction system was introduced, the growers were exploited and as a result got very little for their produce.

During bad days, when there were not enough bidders for the produce, often the Government went to rescue the poor growers. Government fixed the minimum cost-price and bought the whole produce. Now to avoid such loss to Government and to safeguard proper export and to keep up prices, the Government is doing its utmost in informing and educating the growers. Further the ministry for agriculture with the help of the department forecasts the export,—i.e., probable countries that might buy the produce, the kinds and quality that may be expected to be exported, etc.—and the growers educated by the advisory machine and through information which to grow and how much to grow. Thus steady market for the produce is maintained.

CALENDAR

for the year

KHARA & NANDANA

(January 1952 to 15th March 1953)

KHARA

3 Months from Pushya to end of Phalguna

NANDANA

12 Months from Chaitra to end of Phalguna

(ii)

KHARA

DECEMBER—JANUARY

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra- mana	Sowra- mana		
G	Dec.					PUSHYA
	29	Saturday ...	1	14	Padyami ... 23 10	Poorvashada... 27 46
	30	Sunday ...	2	15	Bidige ... 16 51	Uttarashada... 23 11
	31	Monday ...	3	16	Tadige ... 10 40	Sravana ... 18 45
	Jan.					
	1	Tuesday ...	4.5	17	Chouthi ... 4 49 Panchami ... 54 34	Dhanista ... 14 44 Satabhisha ... 11 29
	2	Wednesday	6	18	Shashti ... 55 10	
	3	Thursday...	7	19	Saptami ... 51 58	Poorvabhadra 9 3
	4	Friday ...	8	20	Ashtami ... 49 58	Uttarabhadra 7 42
	5	Saturday ...	9	21	Navami ... 49 11	Revati ... 7 32
	6	Sunday ...	10	22	Dasami ... 49 43	Asvini ... 8 36
	7	Monday ...	11	23	Ekadasi ... 51 25	Bharani ... 10 52
G	8	Tuesday ...	12	24	Dwadasi ... 54 16	Krithika ... 14 18
	9	Wednesday	13	25	Trayodasi ... 57 54	Rohini ... 18 37
	10	Thursday...	14	26	Chaturdasi ... 60 0	Mrigasira ... 20 45
	11	Friday ...	14	27	Chaturdasi ... 2 2	Aridra ... 29 27
	12	Saturday ...	15	28	OPoornima ... 7 10	Punarvasu ... 35 26
						PUSHYA
	13	Sunday ...	1	29	Padyami ... 12 4	Pushya ... 41 25
				Makara		
	14	Monday ...	2	1	Bidige ... 16 48	Aslesha ... 47 12
	15	Tuesday ...	3	2	Tadige ... 21 7	Makha ... 52 27
	16	Wednesday	4	3	Chouthi ... 24 43	Pubba ... 50 48
	17	Thursday...	5	4	Panchami ... 27 17	Uttara ... 60 0
	18	Friday ...	6	5	Shashti ... 29 1	Uttara ... 0 1
	19	Saturday ...	7	6	Sapthami ... 29 25	Hastha ... 2 36
	20	Sunday ...	8	7	Ashtami ... 28 34	Chitta ... 3 39
	21	Monday ...	9	8	Navami ... 26 26	Swathi ... 3 33
	22	Tuesday ...	10	9	Dasami ... 23 8	Vishaka ... 2 16
						Anuradha ... 57 53
	23	Wednesday	11	10	Ekadasi ... 18 46	Jyeshtha ... 56 53
	24	Thursday...	12	11	Dwadasi ... 13 36	Moola ... 52 50
	25	Friday ...	13	12	Trayodasi ... 7 45	Poorvashada... 48 20
	26	Saturday ...	14.30	13	Chaturdasi ... 1 33	Uttarashada... 43 3
					● Amavasya... 56 36	

Yogams	Feasts, Festivals, Govern- ment Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
BUDDHA		Sunrise 6-42 A.M.
Dhruva	...	Car festival at Thirthahalli
Yagatha	...	Poorvashada rain, 1st pada
Iarsua	...	
Vajra	...	Poorvashada rain, 2nd pada
Vyatinatha	...	
Vanyan	...	
Parigha	...	Poorvabhadra rain 3rd pada
Siva	...	
Siddha	...	
Sadya	...	Poorvashada rain, 4th pada
Subha	...	
Subra	...	
Brahma	...	Uttarashada rain, 1st pada
ndra	...	Kudara Vellam
Vaidhriti	...	
SAHULA		
Vishkamba	...	Janaidanaswamy Car festival, Bilahalli
Preeti	...	Uttarashadha rain, 2nd pada, Makara Sankramana
Yushman	...	Uttarayana punyakala
owbhagya	...	Ramaswamy Car festival, Chunchanakatte
hobhana	...	Uttarashada rain, 3rd pada
atiganda	...	
ukarma	...	Tisrostaka
bhriti	...	
hoola	...	
Ganda	...	
Vridhhi	...	
Dhruva-Vyaghata	...	Sravana rain, 1st pada
Harsha	...	
Vajra	...	Purandaradasara Punyadina

JANUARY—FEBRUARY

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						MAGHA
	27	Sunday ...	1	14	Padyami ... 48 55	Sravana ... 39 11
	28	Monday ...	2	15	Bidige ... 43 8	Dhanista ... 35 4
	29	Tuesday ...	3	16	Tadige ... 38 5	Sathabhisha 31 36
	30	Wednesday ...	4	17	Chouthi ... 33 55	Poorvabhadrā 29 0
	31	Thursday ...	5	18	Panchami ... 30 49	Uttarabhadrā 27 23
Feb.	1	Friday ...	6	19	Shasti ... 28 54	Revathi ... 26 59
	2	Saturday ...	7	20	Saptami ... 28 13	Aswini ... 27 46
	3	Sunday ...	8	21	Ashtami ... 28 48	Bharani ... 29 46
	4	Monday ...	9	22	Navami ... 30 36	Kṛithika ... 32 56
	5	Tuesday ...	10	23	Dasami ... 33 24	Rohini ... 37 4
	6	Wednesday ...	11	24	Ekadasi ... 37 7	Mrigasira ... 42 4
	7	Thursday ...	12	25	Dwadasi ... 48 29	Aridra ... 47 43
	8	Friday ...	13	26	Trayodasi ... 46 13	Punarvasu ... 53 36
	9	Saturday ...	14	27	Chaturdasi ... 51 18	Pushya ... 59 43
	10	Sunday ...	15	28	● Poornimā 55 53	Aslesha ... 60 0
						MAGHA
	11	Monday ...	1	29	Padyami ... 60 0	Aslesha ... 5 36
	12	Tuesday ...	1	30	Padyami ... 0 20	Makha ... 10 56
			Kumbha			
	13	Wednesday ...	2	1	Bidige ... 3 32	Pubba ... 15 21
	14	Thursday ...	3	2	Tadige ... 6 11	Uttara ... 19 9
	15	Friday ...	4	3	Chouthi ... 7 32	Hasta ... 21 4
	16	Saturday ...	5	4	Panchami ... 7 48	Chitta ... 23 16
	17	Sunday ...	6	5	Shasti ... 6 47	Swathi ... 23 23
	18	Monday ...	7	6	Saptami ... 4 32	Vishakha ... 22
	19	Tuesday ...	8-9	7	Ashtami ... 1 8	Anuradha ... 20 1
					Navami ... 55 44	
	20	Wednesday ...	10	8	Dasami ... 51 27	Jyesta ... 17 1
	21	Thursday ...	11	9	Ekadasi ... 45 27	Moola ... 13 2
	22	Friday ...	12	10	Dwadasi ... 39 6	Poorvashadha 9
	23	Saturday ...	13	11	Trayodasi ... 32 46	Uttarashadha 4 3
G	24	Sunday ...	14	12	Chaturdasi ... 26 3	Sravana ... 55 2
						Dhanista ... 55 3
	25	Monday ...	30	13	● Amavasya 20 47	Sathabhisha 52

Yogams	Feasts, Festivals Govern- ment, Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-49 A.M.
Siddhi	...	
Vyathipatha	...	Lakshminarasimbaswamy Car festival, Akkihebbal, Car festival at Sibi, Shanthigrama, Karighatta
Variyan	...	
Parigha	...	
Siva-Siddha	...	
Sadya	...	Subrahmanya Shasti, Erulappanajatre, Cattle Show for 8 days
Subha	...	Rathasaptami, Surya Chandra Vrata, Car festival at Srirangapatna
Subra	...	Sravana rain, 4th pada
Brahma	...	Mallikarjunaswamy Car festival at Mudukuthore *
Indra	...	* Sivagange Nelamangala Tk. Nagalamudike Pavgada Tk. Hemmegepura, Anekal Tk. Chunchananakatte Yedatore Tk. Cattle show for 10 days at Mudukuthore, T. Narasi- pur Tk. Kalgurki Srinivasa- pur Tk. Tavarekere, Sira Tk. Honnenahalli, Chick- ballapura Tk. Hemavathi, Krishnarajapet Tk. Nalla- gangamma jat্রে, Gorur Yoganasimha Car festival Cattle show
Vaidrithi	...	Dhanista rain, 1st pada Ekadasi
Visbkamba	...	Ranganathaswamy Car festival, Sivasamudra
Preeti	...	
Ayushman	...	Dhanista rain, 2nd pada †
Sowbhagya	...	Chandra Grahana (Lunar Eclipse) Kotebella Car festival
BAHULA		
Shobhana	...	† Bellur Madhavaswamy Car festival (1) Vokkaleri, Kolar Tk. (2) Channagiri Town, Cattle fair (3) Hari- har Cattle fair (4) Bettada- pur, Hunsur Tk. (5) Talaka- yal Betta, Sidlagatta Tk. (6) Anthagatta, Kadur Tk. (7) Vasanthapura, Bangalore Tk. (8) Srinivasawamy Car festival, Kalhalli Kankan- halli Tk.
Atiganda	...	Dhanista rain, 3rd pada
Sukarma	...	Kumbha Sankramana
Dhriti	...	
Shoola	...	
Ganda	...	
Vridhhi	...	
Dhruva	...	
Vyagatha	...	
Harsha	...	
Vajra-Siddha	...	Car festival at Shimoga, Araga, Vasanthapur
Vyatipatha	...	
Variyan	...	
Parigha	...	
Siva	...	
		Maha Bahula Amavasya

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghalige and Vighaliges
			Chandra- mana	Sowra- mana		
						PHALGUNA
	26	Tuesday ...	1	14	Padyami ... 15 43	Poorvabhadra 49 6
	27	Wednesday	2	15	Bidige ... 11 34	Uttarabhadra 47 16
	28	Thursday...	3	16	Tadige ... 8 26	Revati ... 46 35
	29	Friday ...	4	17	Chouthi ... 6 32	Asvini ... 47 5
Mar.	1	Saturday ...	5	18	Panchami ... 5 5	Bharani ... 48 49
	2	Sunday ...	6	19	Shashti ... 6 30	Krithika ... 51 43
	3	Monday ...	7	20	Saptami ... 8 16	Rohini ... 55 40
	4	Tuesday ...	8	21	Ashtami ... 11 6	Mrigasira ... 60 0
	5	Wednesday	9	22	Navami ... 14 47	Mrigasira ... 1 41
	6	Thursday...	10	23	Dasami ... 19 6	Aridra ... 6 10
	7	Friday ..	11	24	Ekadasi ... 23 46	Punarvasu ... 12 4
	8	Saturday ...	12	25	Dwadasi ... 28 29	Pushya ... 18 6
	9	Sunday ...	13	26	Trayodasi ... 33 8	Aslesha ... 23 59
	10	Monday ...	14	27	Chaturdasi ... 37 16	Makha ... 29 28
H	11	Tuesday ...	15	28	O Poornima... 40 40	Pubba ... 34 19
						PHALGUNA
	12	Wednesday	1	29	Padyami ... 43 8	Uttara ... 40 16
	13	Thursday...	2	1	Bidige ... 44 22	Hastha ... 41 11
	14	Friday ...	3	2	Tadige ... 44 37	Chitta ... 42 57
	15	Saturday ...	4	3	Chouthi ... 43 27	Swathi ... 23 24
	16	Sunday ...	5	4	Panchami ... 41 2	Vishaka ... 42 41
	17	Monday ...	6	5	Shashti ... 37 27	Anuradha ... 40 46
	18	Tuesday ...	7	6	Saptami ... 32 50	Jyeshta ... 37 54
	19	Wednesday	8	7	Ashtami ... 27 25	Moola ... 34 13
	20	Thursday...	9	8	Navami ... 21 24	Poorvashada 29 58
	21	Friday ...	10	9	Dasami ... 15 3	Uttarabhadra 25 26
	22	Saturday ...	11	10	Ekadasi ... 8 38	Shravana ... 20 50
	23	Sunday ...	12-13	11	Dwadasi ... 2 23	} Dhanista ... 16 32
					Trayodasi ... 53 59	
	24	Monday ...	14	12	Chaturdasi ... 51 15	Satabhisha ... 12 48
	25	Tuesday ...	30	13	● Amavasya ... 47 0	Poorvabhadra 9 46
	26	Wednesday	1	14	Padyami ... 43 56	Uttarabhadra 3 36

Yogams	Feasts, Festivals, Govern- ment Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-4 A.M.
Siddha	... Sathabhisha rain, 3rd pada, Kalanathaswamy Car festival, Araga	
Sadya	...	
Subha	... Kasi Visweswaraswamy Car festival	
Subra	... Sathabhisha rain, 4th pada	
Brahma-Indra	... Kumara Shasti, Car festival of Narasimhaswamy, - Doddasaggere Cattle show	
Vaidhriti	...	
Vishkamba	... Poorvabhadra rain, 1st pada	
Preeti	... Thirukuchi Nambi-Teru	
Ayushman	...	
Sowbhagya	...	
Shobana	... Poorvabhadra rain, 2nd pada, Dandu Maramma jat্রে, Cattle show at Madhugiri	
Atiganda	...	
Sukarma	...	
Dhriti	... Poorvabhadra rain, 3rd pada, Thondnoor Gopala- krishnaswamy Car festival	
Shoola	... Kama Dahana, Garudotsava at Ahobalam, Narasimha- swamy Car festival, Devarayana Durga, Tumkur Tk.	
BAHULA	Holi feast	
Ganda	... Karighatta Srinivasaswamy Car festival	
Vridhhi	... Nagamangala Kesavaswamy Car festival	
Dhruva	... Poorvabhadra rain, 4th pada Shadaseethi (Meena) punyakala	
Vyaghatha	...	(1) Suggehalli, Magadi Tk,
Harsha	...	(2) Agara, Bangalore Tk.
Vajra	... Uttarabhadra rain, 1st pada	(3) Nandihalli, Srinivasa- pura Tk.
Siddhi	...	(4) Mittemari, Bagepalli Tk.
Vyathipatha	...	
Variyan	...	
Parigraha	...	
Siva-Siddha	...	
Sadya	...	
Subha	...	
Subra	... Amavasya for all	Madduramma Jat্রে, Cattle show
Brahma	... Nandana year, Chaitra Suddha, Arogyaprathipath.	

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						VAISHAKHA
	25	Friday ...	1	14	Padyami ... 13 45	Bharani ... 27 1
	26	Saturday ...	2	15	Bidige ... 13 49	Krithika ... 27 37
	27	Sunday ...	3	16	Tadige ... 14 25	Rohini ... 32 24
	28	Monday ...	4	17	Chouthi ... 18 2	Mrigasira ... 36 30
	29	Tuesday ...	5	18	Panchami ... 21 30	Aridra ... 42 35
	30	Wednesday	6	19	Shasti ... 25 45	Punarvasu ... 48 30
May	1	Thursday ...	7	20	Saptami ... 31 10	Pushya ... 55 9
	2	Friday ...	8	21	Ashtami ... 36 35	Aslesha ... 60 0
	3	Saturday ...	9	22	Navami ... 40 45	Aslesha ... 1 12
	4	Sunday ...	10	23	Dasami ... 45 10	Makha ... 7 10
	5	Monday ...	11	24	Ekadasi ... 47 24	Pubba ... 12 35
	6	Tuesday ...	12	25	Dwadasi ... 49 10	Uttara ... 16 47
	7	Wednesday	13	26	Trayodasi ... 49 36	Hasta ... 19 30
	8	Thursday ...	14	27	Chaturdasi ... 49 25	Chitta ... 19 54
	9	Friday ...	15	28	O Poornima 48 1	Swathi ... 21 30
						VAISHAKHA
	10	Saturday ...	1	29	Padyami ... 45 3	Vishakha ... 20 20
	11	Sunday ...	2	30	Bidige ... 40 46	Anuradha ... 19 10
	12	Monday ...	3	31	Tadige ... 36 4	Jyesta ... 16 45
	13	Tuesday ...	4	1	Vris haba Chouthi ... 30 30	Moola ... 13 12
	14	Wednesday	5	2	Panchami ... 24 32	Poorvashadha 9 32
	15	Thursday ...	6	3	Shasti ... 18 35	Uttarashadha 5 47
	16	Friday ...	7	4	Saptami ... 12 36	Sravana ... 0 24
	17	Saturday ...	8	5	Ashtami ... 6 32	Dhanista ... 57 32
	18	Sunday ...	9-10	6	Navami ... 0 36	Sathabhisha 54 10
					Dasami ... 55 12	Poorvabhadra 55 25
	19	Monday ...	11	7	Ekadasi ... 49 5	Uttarabhadra 47 25
	20	Tuesday ...	12	8	Dwadasi ... 48 0	Revathi ... 46 12
	21	Wednesday	13	8	Trayodasi ... 45 36	Aswini* ... 45 36
	22	Thursday ...	14	9	Chaturdasi... 44 0	Bharani ... 46 10
	23	Friday ...	30	11	● Amavasya 44 10	Krithika ... 48 0

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Yogams	Feasts, Festivals Govern- ment Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		
Preeti ...		Car festival at Krishnapur, T.-Narasipur Taluk.
Ayushman ...	Bharani rain, 1st pada	
Sowbhagya ...	Akshayya Tadige	Gowri Vratam. Opening Ceremony at Sri Badari Nath.
Shobhana ...	Shankarajayanthi	Car festival at Saligrama for Bhashyakar.
Atiganda ...	Sri Ramanuja Char's Tiru- nakshatram	
Sukarma ...	Bharani rain, 2nd pada	
Dhriti ...		
Shoola ...		
Ganda ...	Bharani rain, 3rd pada	
Vridhhi ...		
Dhruva-Vyagatha ...		
Harsha ...		
Vajra ...	Bharani rain, 4th pada	
Siddhi ...		
Vyathipatha ...	Vyasa Poornima	
BAHULA		
Variyan ...	Krithika rain, 1st pada	
Parigha ...		
Siva ...		
Siddha-Sadya ...	Krithika rain, 2nd pada	Vrishabha Sankramana
Subha ...		
Subra ...		
Brahma ...		
Indra ...	Krithika rain, 3rd pada	
Vaidrithi ...		
Vishkamba ...		
Preeti ...		
Ayushman ...		
Sowbhagya ...	Krithika rain, 4th pada	
Shobhana ...		

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						VAISHAKHA
	25	Friday ...	1	14	Padyami ... 13 45	Bharani ... 27 1
	26	Saturday ...	2	15	Bidige ... 13 49	Krithika ... 27 37
	27	Sunday ...	3	16	Tadige ... 14 25	Rohini ... 32 24
	28	Monday ...	4	17	Chouthi ... 18 2	Mrigasira ... 36 30
	29	Tuesday ...	5	18	Panchami ... 21 30	Aridra ... 42 3
	30	Wednesday	6	19	Shasti ... 25 45	Punarvasu ... 48 30
May	1	Thursday ...	7	20	Saptami ... 31 10	Pushya ... 55 9
	2	Friday ...	8	21	Ashtami ... 36 35	Aslesha ... 60 6
	3	Saturday ...	9	22	Navami ... 40 45	Aslesha ... 1 1
	4	Sunday ...	10	23	Dasami ... 45 10	Makha ... 7 1
	5	Monday ...	11	24	Ekadasi ... 47 24	Pubba ... 12 3
	6	Tuesday ...	12	25	Dwadasi ... 49 10	Uttara ... 16 4
	7	Wednesday	13	26	Trayodasi ... 49 36	Hasta ... 19 3
	8	Thursday ...	14	27	Chaturdasi ... 49 25	Chitta ... 19 5
	9	Friday ...	15	28	O Poornima 48 1	Swathi ... 21 3
						VAISHAKHA
	10	Saturday ...	1	29	Padyami ... 45 3	Vishakha ... 20 2
	11	Sunday ...	2	30	Bidige ... 40 46	Anuradha ... 19 10
	12	Monday ...	3	31	Tadige ... 36 4	Jyesta ... 16 4
				Vris haba		
	13	Tuesday ...	4	1	Chouthi ... 30 30	Moola ... 13 1
	14	Wednesday	5	2	Panchami ... 24 32	Poorvashadha 9 3
	15	Thursday ...	6	3	Shasti ... 18 35	Uttarashadha 5 4
	16	Friday ...	7	4	Saptami ... 12 36	Sravana ... 0 2
						Dhanista ... 57 3
	17	Saturday ...	8	5	Ashtami ... 6 32	Sathabhisha 54 1
	18	Sunday ...	9-10	6	Navami ... 0 36	Poorvabhadra 55 2
					Dasami ... 55 12	
	19	Monday ...	11	7	Ekadasi ... 49 5	Uttarabhadra 47 2
	20	Tuesday ...	12	8	Dwadasi ... 48 0	Revathi ... 46 1
	21	Wednesday	13	8	Trayodasi ... 45 36	Aswini ... 45 3
	22	Thursday ...	14	9	Chaturdasi ... 44 0	Bharani ... 46 1
	23	Friday ...	30	11	● Amavasya 44 10	Krithika ... 48

Yogams	Feasts, Festivals Government Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
BUDDHA		
Preeti ...		Car festival at Krishnapur, T.-Narasipur Taluk.
Ayushman ...	Bharani rain, 1st pada	
Sowbhagya ...	Akshayya Tadige	Gowri Vratham. Opening Ceremony at Sri Badari Nath.
Shobhana ...	Shankarajayanthi	Car festival at Saligrama for Bhashyakar.
Atiganda ...	Sri Ramanuja Char's Tiru-nakshatram	
Sukarma ...	Bharani rain, 2nd pada	
Dhriti ...		
Shoola ...		
Ganda ...	Bharani rain, 3rd pada	
Vridhhi ...		
Dhruva-Vyagatha ...		
Harsha ...		
Vajra ...	Bharani rain, 4th pada	
Siddhi ...		
Vyathipatha ...	Vyasa Poornima	
BAHULA		
Variyan ...	Krithika rain, 1st pada	
Parigha ...		
Siva ...		
Siddha-Sadya ...	Krithika rain, 2nd pada	Vrishabha Sankramana
Subha ...		
Subra ...		
Brahma ...		
Indra ...	Krithika rain, 3rd pada	
Vaidrithi ...		
Wishkamba ...		
Preeti ...		
Ayushman ...		
Sowbhagya ...	Krithika rain, 4th pada	
Shobhana ...		

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						JYESTA
	24	Saturday ...	1	12	Padyami ... 45 10	Rohini ... 51 5
	25	Sunday ...	2	13	Bidige ... 48 6	Mrigasira ... 55 10
	26	Monday ...	3	14	Tadige ... 51 32	Aridra ... 60 0
	27	Tuesday ...	4	15	Chouthi ... 55 48	Aridra ... 0 12
	28	Wednesday	5	16	Panchami ... 60 0	Punarvasu ... 6 32
	29	Thursday...	5	17	Panchami ... 0 32	Pushya ... 13 12
	30	Friday ...	6	18	Shashti ... 5 24	Aslesha ... 19 10
	31	Saturday ...	7	19	Saptami ... 10 12	Makha ... 25 45
June	1	Sunday ...	8	20	Ashtami ... 14 25	Pubba ... 31 10
	2	Monday ...	9	21	Navami ... 17 20	Uttara ... 35 20
	3	Tuesday ...	10	22	Dasami ... 19 12	Hastha ... 38 22
	4	Wednesday	11	23	Ekadasi ... 19 45	Chitta ... 40 35
	5	Thursday...	12	24	Dwadasi ... 19 15	Swathi ... 40 37
	6	Friday ...	13	25	Trayodasi ... 17 24	Vishaka ... 40 32
	7	Saturday ...	14	26	Chaturdasi ... 15 3	Anuradha ... 39 3
	8	Sunday ...	15	27	○Poornima... 10 48	Jyeshta ... 36 35
						JYESTA
	9	Monday ...	1	28	Padyami ... 6 4	Moola ... 33 2
	10	Tuesday ...	2-3	29	Bidige ... 0 32	Poorvashada... 29 24
					Tadige ... 54 36	
	11	Wednesday	4	30	Chouthi ... 48 30	Uttarashada... 25 46
	12	Thursday...	5	31	Panchami ... 42 36	Sravana ... 21 32
	13	Friday ...	6	32	Shashti ... 36 32	Dhanista ... 17 24
				Mithuna		
	14	Saturday ...	7	1	Sapthami ... 30 12	Satabhisha ... 13 48
	15	Sunday ...	8	2	Ashtami ... 25 10	Poorvabhadra 10 12
	16	Monday ...	9	3	Navami ... 21 1	Uttarabhadra 7 35
	17	Tuesday ...	10	4	Dasami ... 17 24	Revati ... 6 1
	18	Wednesday	11	5	Ekadasi ... 14 30	Asvini ... 5 45
	19	Thursday...	12	6	Dwadasi ... 13 12	Bharani ... 5 40
	20	Friday ...	13	7	Trayodasi ... 13 15	Krithika ... 6 24
	21	Saturday ...	14	8	Chaturdasi ... 13 25	Rohini ... 10 10
	22	Sunday ...	30	9	● Amavasya... 16 10	Mrigasira ... 13 45

Yogams

Feasts, Festivals, Govern-
ment Holidays and
Rainfall according to
Nakshatras

Dates of Cattle Fairs, Cattle
Shows, Agricultural
Exhibitions and other
useful notes

SUDDHA

Sunrise 5-57 A.M.

Atiganda ... Rohini rain, 1st pada
Sukarma ...
Dhriti ...
Shoola ...
Ganda ... Rohini rain, 2nd pada

Vridhhi ...
Dhruya ...
Vyaghata ... Rohini rain, 3rd pada

Harsha ...

Vajra ...

Siddhi ...

Vyatipatha ... Rohini rain, 4th pada

Variyan-Parigha ...

Siva ...

Siddha ... Mrigasira rain, 1st pada

Sadya ...

BAHULA

Subha ... Maralli Narasimhaswmy Car festival, Malavalli Tk.
Subra ...

Brahma ... Mrigasira rain, 2nd pada
Indra-Vaidhriti ...
Vishkamba ...

Preeti ... Mrigasira rain, 3rd pada Mithuna Sankramana

Ayushman ...
Sowbhagya ...
Shobhana ...
Atiganda ... Mrigasira rain, 4th pada Ekadasi for all
Sukarma ...

Dhriti ...
Shoola ... Aridra rain, 1st pada Amavasya for all
Ganda ...

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaligers and Vighaliges	Nakshatras in Ghaliges
			Chandra- mana	Sowra- mana		
						ASHADHA
	23	Monday ...	1	10	Padyami ... 19 10	Aridra ... 18 36
	24	Tuesday ...	2	11	Bidige ... 24 36	Punarvasu ... 24 37
	25	Wednesday	3	12	Tadige ... 29 20	Pushya ... 30 36
	26	Thursday ...	4	13	Chouthi ... 34 11	Aslesha ... 37 11
	27	Friday ...	5	14	Panchami ... 39 1	Makha ... 42 32
	28	Saturday ...	6	15	Shashti ... 42 37	Pubba ... 49 10
	29	Sunday ...	7	16	Saptami ... 46 10	Uttara ... 54 1
	30	Monday ...	8	17	Ashtami ... 48 1	Hastha ... 57 30
July	1	Tuesday ...	9	18	Navami ... 48 13	Chitta ... 59 45
	2	Wednesday	10	19	Dasami ... 48 0	Swathi ... 60 0
	3	Thursday ...	11	20	Ekadasi ... 46 11	Swathi ... 0 12
	4	Friday ...	12	21	Dwadasi ... 43 15	Vishakha ... 0 12
	5	Saturday ...	13	22	Trayodasi ... 39 47	Anuradha ... 59 24
	6	Sunday ...	14	23	Chaturdasi ... 14 35	Jyesta ... 56 31
	7	Monday ...	15	24	● Poornima ... 29 0	Moola ... 53 31
						Poorvashada 49 36
						ASHADHA
	8	Tuesday ...	1	25	Padyami ... 23 9	Uttarashada 46 10
	9	Wednesday	2	26	Bidige ... 17 3	Sravana ... 42 24
	10	Thursday ...	3	27	Tadige ... 11 0	Dhanista ... 39 10
	11	Friday ...	4-5	28	Chouthi ... 4 48	Sathabhisha ... 33 45
					Panchami ... 55 0	
	12	Saturday ...	6	29	Shashti ... 54 1	Poorvabhadra 30 40
	13	Sunday ...	7	30	Saptami ... 49 36	Uttarabhadra 28 12
	14	Monday ...	8	31	Ashtami ... 46 11	Revati ... 26 1
	15	Tuesday ...	9	32	Navami ... 43 15	Asvini ... 24 37
				Kataka		
	16	Wednesday	10	1	Dasami ... 42 0	Bharani ... 24 38
	17	Thursday ...	11	2	Ekadasi ... 40 45	Krithika ... 26 24
	18	Friday ...	12	3	Dwadasi ... 42 36	Rohini ... 28 49
	19	Saturday ...	13	4	Trayodasi ... 45 1	Mrigasira ... 32 24
	20	Sunday ...	14	5	Chaturdasi ... 43 30	Aridra ... 36 37
	21	Monday ...	30	6	● Amavasya 52 46	Punarvasu ... 42 38

ASHADHA

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Yogams	Feasts, Festivals, Government Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-0
Vridhhi ...		
Druva ...		
Vyaghatha ...	Aridra rain, 2nd pada	
Harsha ...		
Vajra ...		
Siddhi ...	Aridra rain, 3rd pada	
Vyathipatha ...		
Variyan ...		
Parigha ...		
Siva ...		
Si ha ...	Aridra rain, 4th pada	
Sadya ...	Ekadasi for all.	
Subha ...		
Subra ...		
Brahma ...		
BAHULA		
Indra ...		
Vidrithy ...	Punarvasu rain, 2nd pada	
Vishkambha ...		
Preethi ...		
Ayushman ...	Punarvasu rain, 3rd pada	
Soubhagya ...		
Shobhana ...		
Athiganda ...		
Sukarma ...	Punarvasu rain, 4th pada	
Drithi ...	Dakshinayana Punyakala	
Shoola ...	Ekadasi for all	
Ganda ...	Pushya rain, 1st pada	
Vridhhi ...		
Druva ...	(For all) Bhima Amavasya	

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghalige and Vighaliges
			Chandra- mana	Sowra- mana		
						SRAVANA
	22	Tuesday ...	1	7	Padyami ... 57 36	Pushya ... 49 1
	23	Wednesday	2	8	Bidige ... 60 0	Aslesha ... 55 50
	24	Thursday...	3	9	Bidige ... 4 10	Makha ... 60 0
	25	Friday ...	3	10	Tadige ... 7 12	Makha ... 1 48
	26	Saturday ...	4	11	Chouthi ... 11 25	Pubba ... 7 12
	27	Sunday ...	5	12	Panchami ... 13 48	Uttara ... 12 0
	28	Monday ...	6	13	Shashti ... 16 20	Hastha ... 15 36
	29	Tuesday ...	7	14	Saptami ... 17 25	Chitta ... 18 10
	30	Wednesday	8	15	Ashtami ... 16 12	Swathi ... 19 36
	31	Thursday...	9	16	Navami ... 15 1	Vishaka ... 19 35
Aug	1	Friday ..	10	17	Dasami ... 12 37	Anuradha ... 18 12
	2	Saturday ...	11	18	Ekadasi ... 9 1	Jyeshtha ... 16 45
	3	Sunday ...	12-13	19	Dwadasi ... 5 21	Moola ... 11 0
					Trayodasi ... 54 39	
	4	Monday ...	14	20	Chaturdasi ... 52 49	Poorvashada 10 40
	5	Tuesday ...	15	21	O Poornima... 46 47	Uttarashadha 6 36
						SRAVANA
	6	Wednesday	1	22	Padyami ... 40 48	Sravana ... 2 24
						Dhanista ... 57 36
	7	Thursday...	2	23	Bidige ... 34 49	Satabhisha ... 54 12
	8	Friday ...	3	24	Tadige ... 28 42	Poorvabhadra 51 10
	9	Saturday ...	4	25	Chouthi ... 23 25	Uttarabhadra 48 12
	10	Sunday ...	5	26	Panchami ... 19 12	Revati ... 45 38
	11	Monday ...	6	27	Shashti ... 15 40	Asvini ... 43 48
	12	Tuesday ...	7	28	Saptami ... 12 36	Bharani ... 43 50
	13	Wednesday	8	29	Ashtami ... 11 24	Krithika ... 45 5
	14	Thursday...	9	30	Navami ... 10 45	Rohini ... 47 32
	15	Friday ...	10	31	Dasami ... 12 3	Mrigasira ... 50 28
				Simha		
	16	Saturday ...	11	1	Ekadasi ... 14 28	Aridra ... 55 5
	17	Sunday ...	12	2	Dwadasi ... 18 0	Punarvasu ... 60 0
	18	Monday ...	13	3	Trayodasi ... 22 10	Punarvasu ... 0 36
	19	Tuesday ...	14	4	Chaturdasi ... 27 0	Pushya ... 5 36
	20	Wednesday	30	5	● Amavasya ... 35 28	Aslesha ... 13 12

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Yogams	Feasts, Festivals, Government Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-1 A.M.
Vyaghatha ...		
Harsha ...	Punarvasu rain, 2nd pada	
Vajra ...		
Siddhi ...		
Vyathipatha ...	Pushya rain, 3rd pada	
Variyan ...		
Parigha-Siva ...		
Siddha ...		
Sadya ...	Pushya rain, 4th pada	
Subha ...		
Subra ...		
Brahma ...	Aslesha rain, 1st pada	
Indra ...		
Vaidhriti ...		
Vishkamba-Preeti ...	Upakarma	
BAHULA		
Ayushman ...	Aslesha rain, 2nd pada	
Sowbhagya ...		
Shobana ...		
Atiganda ...		
Sukarma ...	Aslesh rain, 3rd pada	
Dhriti ...		
Shoola ...		
Ganda ...	Aslesha rain, 4th pada	
Vridhhi ...		
Dhruva ...		
Vyaghatha ...	Makha rain, 1st pada	Ekadasi for all, Simhasankramana
Harsha ...		
Vajra ...		
Siddhi ...		
Vyathipatha-Variyan	Amavasya for all	

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghalige and Vighaliges
			Chandra- mana	Sowra- mana		
						BHADRAPAD
	21	Thursday...	1	6	Padyami ... 36 27	Makha ... 19 38
	22	Friday ...	2	7	Bidige ... 40 47	Pubba ... 25 48
	23	Saturday ...	3	8	Tadige ... 45 48	Uttara ... 30 36
	24	Sunday ...	4	9	Chouthi ... 46 10	Hastha ... 34 36
	25	Monday ...	5	10	Panchami ... 47 37	Chitta ... 37 50
	26	Tuesday ...	6	11	Shashti ... 46 47	Swathi ... 39 0
	27	Wednesday	7	12	Saptami ... 46 48	Vishaka ... 39 37
	28	Thursday...	8	13	Ashtami ... 43 47	Anuradha ... 38 24
	29	Friday ..	9	14	Navami ... 39 0	Jyeshta ... 37 14
	30	Saturday ...	10	15	Dasami ... 34 36	Moola ... 34 14
	31	Sunday ...	11	16	Ekadasi ... 29 25	Poorvashada 30 36
Sept	1	Monday ...	12	17	Dwadasi ... 23 31	Uttarashadha 27
	2	Tuesday ...	13	18	Trayodasi ... 17 30	Sravana ... 23 28
	3	Wednesday	14	19	Chaturdasi ... 11 28	Dhanista ... 19 22
	4	Thursday...	15	20	O Poornima... 5 27	Satabhisha ... 15 14
						BHADRAPAD
	5	Friday ...	1-2	21	Padyami ... 5 49	Poorvabhadra 11 36
					Bidige ... 50 11	
	6	Saturday ...	3	22	Tadige ... 50 31	Uttarabhadra 7 4
	7	Sunday ...	4	23	Chouthi ... 46 49	Revati ... 5 2
	8	Monday ...	5	24	Panchami ... 43 49	Asvini ... 3 3
	9	Tuesday ...	6	25	Shashti ... 42 36	Bharani ... 3 3
	10	Wednesday	7	26	Saptami ... 42 0	Krithika ... 4 1
	11	Thursday...	8	27	Ashtami ... 43 15	Rohini ... 6 1
	12	Friday ...	9	28	Navami ... 45 40	Mrigasira ... 9
	13	Saturday ...	10	29	Dasami ... 49 10	Aridra ... 13 1
	14	Sunday ...	11	30	Ekadasi ... 53 3	Punarvasu ... 19 1
	15	Monday ...	12	31	Dwadasi ... 58 15	Pushya ... 25 1
				Kanya		
	16	Tuesday ...	13	1	Trayodasi ... 60 0	Aslesha ... 31 1
	17	Wednesday	13	2	Trayodasi ... 3 36	Makha ... 37 3
G	18	Thursday...	14	3	Chaturdasi ... 8 24	Pubba ... 43 4
	19	Friday ...	30	4	● Amavasya ... 12 36	Uttara ... 49 1

1952

Yogams	Feasts, Festivals, Government Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-12
Parigha ...		
Siva ...	Makha rain, 3rd pada	
Siddha ...		
Sadya ...		
Subha ...		
Subra ...		
Brahma ...	Makha rain, 4th pada	
Indra-Vidrithy ...		
Vishkambha ...		
Preethi ..	Pubba rain, 1st pada	
Ayushman ...		
Soubhagya ...		
Shobhana ...	Pubba rain, 2nd pada	
Athiganda ...	Anantha Padmanabha	
Sukarma-Drithi ...	Caturdasi Vratam	
BAHULA		
Shoola ...		
Ganda ...	Pubba rain, 3rd pada	
Vridhhi ...		
Dhruva ...		
Vyaghatha ...	Pubba rain, 4th pada	
Harsha ...		
Vajra ...	Mannar Krishna Jayanthi.	
Siddhi ...	Tholappar Krishna „	
Vyathipatha ...	Uttara rain, 1st pada	
Variyan ...		
Parigha ...		
Siva ...	Uttara rain, 2nd pada	
Siddha ...		
Sadya ...	Amavasya for all	
Subha ...		

SEPTEMBER—OCTOBER

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra- mana	Sowra- mana		
						ASWAYUJA
G	20	Saturday ...	1	5	Padyami ... 15 37	Hastha ... 53 24
	21	Sunday ...	2	6	Bidige ... 18 0	Chitta ... 56 20
	22	Monday ...	3	7	Tadige ... 18 37	Swathi ... 58 10
	23	Tuesday ...	4	8	Chouthi ... 19 14	Vishaka ... 59 49
	24	Wednesday	5	8	Pānchami ... 18 0	Anuradha ... 59 45
	25	Thursday...	6	10	Shashti ... 15 36	Jyeshta ... 57 0
	26	Friday ...	7	11	Saptami ... 11 30	Moola ... 52 37
	27	Saturday ...	8	12	Ashtami ... 6 37	Poorvashada... 51 0
	28	Sunday ...	9-10	13	Navami ... 1 48 Dasami ... 56 25	Uttarashada... 47 31
G	29	Monday ...	11	14	Ekadasi ... 50 26	Sravana ... 43 48
G Oct.	30	Tuesday ...	12	15	Dwadasi ... 44 28	Dhanista ... 39 36
	1	Wednesday	13	16	Trayodasi ... 38 25	Satabhisha ... 35 31
	2	Thursday...	14	17	Chaturdasi ... 32 24	Poorvabhadra 31 12
	3	Friday ...	15	18	○Poornima .. 27 37	Uttarabhadra 28 15
						ASWAYUJA
	4	Saturday ...	1	19	Padyami ... 23 28	Revati ... 25 12
	5	Sunday ...	2	20	Bidige ... 19 38	Asvini ... 24 0
	6	Monday ...	3	21	Tadige ... 16 49	Bharani ... 22 48
	7	Tuesday ...	4	22	Chouthi ... 15 40	Krithika ... 23 28
	8	Wednesday	5	23	Panchami ... 15 36	Rohini ... 24 38
	9	Thursday...	6	24	Shashti ... 16 49	Mrigasira ... 27 37
	10	Friday ...	7	25	Sapthami ... 19 15	Aridra ... 31 47
	11	Saturday ...	8	26	Ashtami ... 24 46	Punarvasu ... 39 10
	12	Sunday ...	9	27	Navami ... 27 10	Pushya ... 43 15
	13	Monday ...	10	28	Dasami ... 31 48	Aslesha ... 45 10
	14	Tuesday ...	11	29	Ekadasi ... 37 10	Makha ... 55 45
	15	Wednesday	12	30	Dwadasi ... 42 35	Pubba ... 60 0
	16	Thursday...	13	31	Trayodasi ... 46 45	Pubba ... 2 24
	17	Friday ...	Thula 14	1	Chaturdasi ... 50 40	Uttara ... 7 48
	18	Saturday ...	30	2	● Amavasya ... 52 15	Hastha ... 12 0

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Yogams	Feasts, Festivals Govern- ment Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-12
Subra ...	Uttara rain, 3rd pada.	Navarathri.
Brahma ...		
Indra ...		
Vaidrithi ...	Uttara rain, 4th pada	
Vishkamba ...		
Preeti ...		
Ayushman ...	Hasta rain, 1st pada	Saraswathipuja.
Sowbhagya ...	Durgastami	
Shobhana ...		
Atiganda ...	Mahanavani Hayagreevapuja, Vijayadasami for some people.	
Sukarma ...	Vijayadasami	
Dhriti ...	Hasta rain, 2nd pada	
Shoola ...		
Ganda ...		
Vridhhi ...	Hasta rain, 3rd pada	
BAHULA		
Dhruva ...		
Vyaghatha ...		
Harsha ...		
Vajra ...	Hasta rain, 4th pada	
Siddhi ...		
Vyathipatha ...		
Variyan ...	Chitta rain, 1st pada	
Parigha ...		
Siva ...		
Siddha ...	Chitta rain, 2nd pada	
Sadya ...		
Subha ...		
Subra ...		
Brahma ...	Chitta rain, 3rd pada. Sankramana.	Narakachaturdasi, Thula
Indra ...		
Vaidrithi ...		

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						KARTHIKA
	19	Sunday ...	1	3	Padyami ... 53 28	Chitta ... 15 10
	20	Monday ...	2	4	Bidige ... 53 26	Swathi ... 17 24
	21	Tuesday ...	3	5	Tadige ... 53 25	Vishakha ... 18 1
	22	Wednesday	4	6	Chouthi ... 49 48	Anuradha ... 18 0
	23	Thursday ...	5	7	Panchami ... 46 15	Jyesta ... 16 45
	24	Friday ...	6	8	Shasti ... 42 0	Moola ... 14 28
	25	Saturday ...	7	9	Saptami ... 36 37	Poorvashadha 11 28
	26	Sunday ...	8	10	Ashtami ... 31 17	Uttarashadha 7 50
	27	Monday ...	9	11	Navami ... 25 16	Sravana ... 4 12
	28	Tuesday ...	10	12	Dasami ... 19 10	Dhanista ... 4 19
	29	Wednesday	11	13	Ekadasi ... 13 12	Sathathara ... 55 40
	30	Thursday ...	12	14	Dwadasi ... 7 50	Poorvabhadra 51 40
	31	Friday ...	13-14	15	Trayodasi ... 3 0	Uttarabhadra 48 0
Nov					Chaturdasi ... 55 49	Revathi ... 45 41
1		Saturday ...	15	16	O Poornima 54 42	Aswini ... 43 50
						KARTHIKA
	2	Sunday ...	1	17	Padyami ... 52 15	Bharani ... 42 42
	3	Monday ...	2	18	Bidige ... 51 32	Krithika ... 42 43
	4	Tuesday ...	3	19	Tadige ... 51 36	Rohini ... 43 39
	5	Wednesday	4	20	Chouthi ... 52 49	Mrigasira ... 46 40
	6	Thursday ...	5	21	Panchami ... 55 15	Aridra ... 50 25
	7	Friday ...	6	22	Shasti ... 58 50	Punarvasu ... 55 12
	8	Saturday ...	7	23	Saptami ... 60 0	Pushya ... 60 0
	9	Sunday ...	7	23	Saptami ... 3 36	Pushya ... 0 36
	10	Monday ...	8	25	Ashtami ... 9 0	Aslesha ... 5 36
	11	Tuesday ...	9	26	Navami ... 14 25	Makha ... 13 40
	12	Wednesday	10	27	Dasami ... 19 15	Pubba ... 20 20
	13	Thursday ...	11	28	Ekadasi ... 23 31	Uttara ... 25 48
	14	Friday ...	12	29	Dwadasi ... 27 1	Hasta ... 30 10
	15	Saturday ...	13	30	Trayodasi ... 30 5	Chitta ... 34 12
				Vrischika		
	16	Sunday ...	14	1	Chaturdasi ... 30 16	Swathi ... 36 5
	17	Monday ...	30	2	● Amavasya 30 0	Vishakha ... 37 16

Yogams	Feasts, Festivals, Government Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-14 A.M.
Vishkamba	... Deepavali, Balindra Puja	
Preeti	... Chitta rain, 4th pada	
Ayushman	...	
Sowbhagya	...	
Shobana	... Swathi rain, 1st pada	
Atiganda	...	
Sukarma-Dhriti	...	
Shoola	...	
Ganda	... Swathi rain, 2nd pada	
Vridhhi	...	
Druva	... Ekadasi for all	
Vyagatha	...	
Harsha	... Swathi rain, 3rd pada	
Vajra	...	
BAHULA		
Siddhi	... Swathi rain, 4th pada	
Vyathipatha	...	
Variyan	...	
Parigha	...	
Siva	... Vishakha rain, 1st pada	
Siddha	...	
Sadhya	...	
Subha	... Vishakha rain, 2nd pada	
Subra	...	
Brahma	...	
Indra	... Vishakha rain, 3rd pada	
Vaidriti	... Ekadasi for all	
Vishkamba	...	
Preeti	...	
Ayushman	... Vishakha rain, 4th pada	Vrischika Sankramana
Sowbhagya-Shobana	Amavasya for all	

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaligers and Vighaliges	Nakshatras in Ghaliges
			Chandra- mana	Sowra- mana		
						MARGASIRA
	18	Tuesday ...	1	3	Padyami ... 28 50	Anuradha ... 37 30
	19	Wednesday	2	4	Bidige ... 26 32	Jyesta ... 56 35
	20	Thursday ...	3	5	Tadige ... 22 49	Moola ... 34 12
	21	Friday ...	4	6	Chouthi ... 18 36	Poorvashada 31 16
	22	Saturday ...	5	7	Panchami ... 13 49	Uttarashada 27 36
	23	Sunday ...	6	8	Shashti ... 5 24	Sravana ... 19 50
	24	Monday ...	7-8	9	Saptami ... 2 24 Ashtami ... 56 30	Dhanista ... 19 50
	25	Tuesday ...	9	10	Navami ... 50 25	Sathabhisha ... 15 41
	26	Wednesday	10	11	Dasami ... 45 9	Poorvabhadra 12 0
	27	Thursday ...	11	12	Ekadasi ... 40 13	Uttarabhadra 8 31
	28	Friday ...	12	13	Dwadasi ... 35 37	Revati ... 5 25
	29	Saturday ...	13	14	Trayodasi ... 32 32	Asvini ... 3 36
	30	Sunday ...	14	15	Chaturdasi ... 30 0	Bharani ... 1 48
Dec.	1	Monday ...	15	16	○ Poornima... 29 24	Krithika ... 1 50
						MARGASIRA
	2	Tuesday ...	1	17	Padyami ... 30 10	Rohini ... 3 3
	3	Wednesday	2	18	Bidige ... 31 12	Mrigasira ... 5 29
	4	Thursday ...	3	19	Tadige ... 33 38	Aridra ... 9 1
	5	Friday ...	4	20	Chouthi ... 37 13	Punarvasu ... 13 10
	6	Saturday ...	5	21	Panchami ... 42 0	Pushya ... 18 37
	7	Sunday ...	6	22	Shashti ... 46 49	Aslesha ... 24 39
	8	Monday ...	7	23	Saptami ... 53 13	Makha ... 31 51
	9	Tuesday ...	8	24	Ashtami ... 57 41	Pubba ... 38 27
	10	Wednesday	9	25	Navami ... 60 0	Uttara ... 43 51
	11	Thursday ...	9	26	Navami ... 1 48	Hastha ... 48 38
	12	Friday ...	10	27	Dasami ... 5 25	Chitta ... 52 48
	13	Saturday ...	11	28	Ekadasi ... 7 50	Swathi ... 55 49
	14	Sunday ...	12	29	Dwadasi ... 9 0	Vishakha ... 57 13
				Dha nus		
	15	Monday ...	13	1	Trayodasi ... 8 24	Anuradha ... 57 0
	16	Tuesday ...	14	2	Chaturdasi ... 7 12	Jyesta ... 56 24
	17	Wednesday	30	3	● Amavasya 4 12	Moola

Yogams	Feasts, Festivals, Govern- ment Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-22 A.M.
Atiganda	...	
Sukarma	... Anuradha rain, 1st pada	
Dhriti	...	
Shoola	...	
Ganda	... Anuradha rain, 2nd pada	
Vridhhi-Dhruva	... Champashasti Subrahmanyaswami car festival, Chitravathi	
Vyaghata	... Rajamudi at Melkote	
Harsha	... Anuradha rain, 3rd pada	
Vajra	...	
Siddhi	...	
Vyatipatha	... Uthana Dwadasi Brindavanotsava	
Variyan	... Anuradha rain, 4th pada	
Parigha	...	
Siva	... Thirumanga Alwar Tirunakshatram, Kartheekadeepa	
BAHULA		
Siddha	... Jyesta rain, 1st pada Tirupani Alwar Tirunakshatra	
Sadya	...	
Subha	...	
Suba	... Jyesta rain, 2nd pada	
Brahma	...	
Indra	...	
Vandhriti	... Jyesta rain, 3rd pada	
Vishkamba	...	
Preeti	...	
Ayushman	...	
Sowbhagya	... Jyesta rain, 4th pada	
Shobhana	... Ekadasi for all	
Atiganda	...	
Sukarma	... Moola rain, 1st pada Dhanus Sankramana commence-	
Dhriti-Shoola	... Amavasya for all	ment of Dhanus pooja
Ganda	... Ellu Amavasya, Thungana di Snana	

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						PUSHYA
	18	Thursday ..	1-2	4	Padyami ... 0 36 Bidige ... 56 20	Poorvashada 52 12
	19	Friday ...	3	5	Tadige ... 51 37	Uttarashadha 48 37
	20	Saturday ...	4	6	Chouthi ... 46 12	Sravana ... 44 24
	21	Sunday ...	5	7	Panchami ... 40 17	Dhanista ... 40 12
	22	Monday ...	6	8	Shashti ... 34 15	Satabhisha ... 36 0
	23	Tuesday ...	7	9	Saptami ... 28 15	Poorvabhadra 32 29
G	24	Wednesday	8	10	Ashtami ... 22 50	Uttarabhadra 28 49
	25	Thursday...	9	11	Navami ... 18 10	Revati ... 25 50
	26	Friday ..	10	12	Dasami ... 13 50	Asvini ... 23 28
	27	Saturday ...	11	13	Ekadasi ... 10 48	Bharani ... 21 38
	28	Sunday ...	12	14	Dwadasi ... 9 40	Kritika ... 21 39
	29	Monday ...	13	15	Trayodasi ... 8 27	Rohini ... 22 13
	30	Tuesday ...	14	16	Chaturdasi ... 8 24	Mrigasira ... 24 0
	31	Wednesday	15	17	O Poornima... 9 36	Aridra ... 27 16
						PUSHYA
Ja.	1953					
	1	Thursday...	1	18	Padyami ... 12 0	Punarvasu ... 31 12
	2	Friday ...	2	19	Bidige ... 15 40	Pushya ... 36 36
	3	Saturday ...	3	20	Tadige ... 20 25	Aslesha ... 43 10
	4	Sunday ...	4	21	Chouthi ... 25 49	Makha ... 49 49
	5	Monday ...	5	22	Panchami ... 31 12	Pubba ... 56 30
	6	Tuesday ...	6	23	Shashti ... 36 36	Uttara ... 60 0
	7	Wednesday	7	24	Saptami ... 41 24	Uttara ... 1 48
	8	Thursday...	8	25	Ashtami ... 42 25	Hastha ... 7 12
	9	Friday ...	9	26	Navami ... 47 30	Chitta ... 12 10
	10	Saturday ...	10	27	Dasami ... 48 10	Swathi ... 14 30
	11	Sunday ...	11	28	Ekadasi ... 47 23	Vishaka ... 16 13
	12	Monday ...	12	29	Dwadasi ... 46 15	Anuradha ... 16 50
	13	Tuesday ...	13	30	Trayodasi ... 43 14	Jyeshtha ... 16 16
					Makara	
G	14	Wednesday	14	1	Chaturdasi ... 39 39	Moola ... 15 5
	15	Thursday ..	30	2	● Amavasya... 35 27	Poorvashada 15 0

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Yogams	Feasts, Festivals, Government Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-38 A.M.
Vridhhi ...	Moola rain, 2nd pada	Car festival of Rameswara-swami at Thirthahalli, Cattle Show
Dhruva ...		
Vyagatha ...		
Harsha ...	Moola rain, 3rd pada	
Vajra ...	Tulu Shasti, Cattle Show	at Doddakurugodu
Siddhi-Vyathipatha ...		
Variyan ...		
Parigha ...	Moola rain, 4th pada	
Siva ...		
Siddha ..	Paramapada Ekadasi	
Madhya ..		
Subha ..	Poorvashadha rain, 1st pada	
Subra ...		
Brahma ..	Poorvashadha rain, 2nd pada	
BAHULA		
Indra ..		
Vsidruhi ...		
Visakamba ...		
Præthi ...	Poorvashadha rain, 3rd pada	
Ayushman ...		
Sowbhagya ...		
Shravana ...	Poorvashadha rain, 4th pada	
Atigandha ...		
Sukama ...		
Dhriti ...	Uttarashadha rain, 1st pada	
Shoola ...	Ekadasi for all	
Gandha ...		
Vaidika ...	Uttarashadha rain, 2nd pada	
Druva-Vyagatha	Makara Sankranthi	
Harsha ..	Thai Amavasya for all	Garuda Jayanthi, Purandara-dasara Punvadipa

JANUARY—FEBRUARY

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						MAGHA
	16	Friday ...	1	3	Padyami ... 30 14	Uttarashada... 11 28
	17	Saturday ...	2	4	Bidige ... 24 37	Shravana ... 4 8
	18	Sunday ...	3	5	Tadige ... 18 38	Dhanista ... 0 37 Satabhisha ... 56 27
	19	Monday ...	4	6	Chouthi ... 15 10	Poorvabhadra 52 49
	20	Tuesday ...	5	7	Panchami ... 6 37	Uttarabhadra 49 16
	21	Wednesday	6-7	8	Shashti ... 1 10 Saptami ... 56 32	Revati ... 44 41
	22	Thursday...	8	9	Ashtami ... 52 31	Asvini ... 43 14
	23	Friday ...	9	10	Navami ... 49 14	Bharani ... 41 27
	24	Saturday ...	10	11	Dasami ... 47 28	Krithika ... 40 48
	25	Sunday ...	11	12	Ekadasi ... 46 51	Rohini ... 41 27
G	26	Monday ...	12	13	Dwadasi ... 46 54	Mrigasira ... 43 14
	27	Tuesday	13	14	Trayodasi ... 48 10	Aridra ... 45 37
	28	Wednesday	14	15	Chaturdasi ... 51 5	Punarvasu ... 49 50
	29	Thursday...	15	16	OPoornima .. 55 12	Pushya ... 55 14
						MAGHA
	30	Friday ..	1	17	Padyami ... 60 0	Aslesha ... 60 0
	31	Saturday ...	1	18	Padyami ... 0 15	Aslesha ... 0 24
Feb.	1	Sunday ..	2	19	Bidige ... 5 24	Makha ... 7 34
	2	Monday ...	3	20	Tadige ... 0 49	Pubba ... 13 44
	3	Tuesday ...	4	21	Chouthi ... 15 36	Uttara ... 19 48
	4	Wednesday	5	22	Panchami ... 20 27	Hastha ... 25 50
	5	Thursday...	6	23	Shashti ... 23 30	Chitta ... 30 10
	6	Friday ...	7	24	Sapthami ... 25 49	Swathi ... 33 37
	7	Saturday ...	8	25	Ashtami ... 27 10	Vishaka ... 35 24
	8	Sunday ...	9	26	Navami ... 25 48	Anuradha ... 36 1
	9	Monday ...	10	27	Dasami ... 24 10	Jyeshtha ... 36 0
	10	Tuesday ...	11	28	Ekadasi ... 21 14	Moola ... 35 23
	11	Wednesday	12	29	Dwadasi ... 16 48	Poorvashada... 31 49
				Kumbha		
G	12	Thursday...	13	1	Trayodasi ... 12 39	Uttarashadha 28 50
	13	Friday ...	14	2	Chaturdasi ... 7 49	Shravana ... 25 15
	14	Saturday ...	30	3	● Amavasya ... 1 48	Dhanista ... 21 37

1953

Yogams	Feasts, Festivals Govern- ment Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
SUDDHA		Sunrise 6-49
Vajra ...		
Siddhi ...	Uttarashadha rain, 3rd pada	Paryayotsava at Udipi
Vyathipatha ...		
Variyan ...		
Parigha ...	Uttarashadha rain, 4th pada	
Siva ...	Rathasaptami, Ranganathaswami	Car festival at Hemagiri
Siddha ...		
Sadya ...	Sravana rain, 1st pada.	
Subha-Subra ...		
Brahma ...		
Indra ...	Sravana rain, 2nd pada	
Vaidrithi ...		
Vishkamba ...		
Preethi ...	Sravana rain, 3rd pada	
BAHULA		
Preethi ...		
Ayushman ...		
Sowbhagya ...		
Shobhana-Atiganda ...	Sravana rain, 4th pada	
Sukarma ...		
Dhriti ...		
Shoola ...	Dhanista rain, 1st pada	
Ganda ...		
Vridddhi ...		
Dhruva ...	Dhanista rain, 2nd pada	
Vyaghatha ...		
Harsha ...		
Vajra ...		
Siddhi-Vyathipatha ...	Kumbha Sankramana.	Mahasivarathri
Variyan ...	Amavasya for all	
Parigha ...		

Holidays	English Dates	Days of the week	Dates		Thithies in Ghaliges and Vighaliges	Nakshatras in Ghaliges and Vighaliges
			Chandra-mana	Sowra-mana		
						PHALGUNA
	15	Sunday ...	1-2	4	Padyami ... 3 50 Bidige ... 51 36	Sathathara ... 17 30
	16	Monday ...	3	5	Tadige ... 44 1	Poorvabhadra 13 10
	17	Tuesday ...	4	6	Chouthi ... 38 36	Uttarabhadra 9 11
	18	Wednesday	5	7	Panchami ... 33 40	Revathi ... 5 24
	19	Thursday ...	6	8	Shasti ... 29 24	Aswini ... 3 2
	20	Friday ...	7	9	Saptami ... 26 28	Bharani ... 1 12
	21	Saturday ...	8	10	Ashtami ... 24 39	Krithika ... 0 36
	22	Sunday ...	9	11	Navami ... 24 4	Rohini ... 0 50
	23	Monday ...	10	12	Dasami ... 24 48	Mrigasira ... 1 48
	24	Tuesday ...	11	13	Ekadasi ... 25 50	Aridra ... 4 12
	25	Wednesday	12	14	Dwadasi ... 28 14	Punaryasu ... 9 1
	26	Thursday ...	13	15	Trayodasi ... 32 28	Pushya ... 13 48
	27	Friday ...	14	16	Chaturdasi ... 36 48	Aslesha ... 19 12
	28	Saturday ...	15	17	● Poornima 43 18	Makha ... 25 14
						PHALGUNA
Mar.	1	Sunday ...	1	18	Padyami ... 48 0	Pubba ... 31 47
	2	Monday ...	2	19	Bidige ... 52 30	Uttara ... 38 25
	3	Tuesday ...	3	20	Tadige ... 57 0	Hasta ... 44 30
	4	Wednesday	4	21	Chouthi ... 60 10	Chitta ... 48 39
	5	Thursday ...	4	22	Chouthi ... 0 16	Swathi ... 52 14
	6	Friday ...	5	23	Panchami ... 2 4	Vishakha ... 52 36
	7	Saturday ...	6	24	Shasti ... 3 0	Anuradha ... 55 60
	8	Sunday ...	7	25	Saptami ... 2 24	Jyesta ... 55 56
	9	Monday ...	8-9	26	Ashtami ... 0 36 Navami ... 56 1	Moola ... 54 39
	10	Tuesday ...	10	27	Dasami ... 53 29	Poorvashadha 52 12
	11	Wednesday	11	28	Ekadasi ... 48 36	Uttarashadha 59 12
	12	Thursday ...	12	29	Dwadasi ... 44 0	Sravana ... 45 38
	13	Friday ...	13	30	Trayodasi ... 37 36	Dhanista ... 42 0
				Meena		
	14	Saturday ...	14	1	Chaturdasi ... 31 50	Sathathara ... 37 40
	15	Sunday ...	30	2	● Amavasya 24 40	Poorvabhadra 33 37
G	16	Monday ...	1	3	Padyami ... 19 30	Uttarabhadra 29 28

1953

Yogams	Feasts, Festivals, Govern- ment Holidays and Rainfall according to Nakshatras	Dates of Cattle Fairs, Cattle Shows, Agricultural Exhibitions and other useful notes
Suddha		Sunrise 6-45
Siva	... Dhanista rain, 4th pada	
Siddha	...	
Sadya	...	
Subha	... Sathathara rain, 1st pada	
Subra	...	
Bramma	...	
Indra	...	
Vidrithy	... Sathathara rain, 2nd pada	
Vishkambha	...	
Preethi	...	
Ayushman	... Sathathara rain, 3rd pada	
Sambhagya	...	
Sambhaga	...	
Atiganda	... Sathathara rain, 4th pada	
BAHULA		
Sukarna	...	
Datta	...	
Shodha	...	
Ganda	... Poorvabhadra rain 1st pada	
Vridhai	...	
Daruha	...	
Vagadha-Harsa	...	
Vajra	...	
Siddha	...	
Vagadha	... Poorvabhadra rain 3rd pada	
Vamana	...	
Pangha	... Sravana Dwadasi	
Siva-Siddha	...	
Sadya	... Meena Sankramna, Bodhayana Amavasya	
Subha	... Amavasya for all	
Subra	... Vijaya Year, Chaitra Suddha Ugadi Lunar year	

RAHUKALA AND GULIKAKALA

Rahukala	Days of week			Gulikakala
4-30 to 6 P.M.	Sunday	...	...	3 to 4-30 P.M.
7-30 to 9 A.M.	Monday	...	...	1-30 to 3 P.M.
3 to 4-30 P.M.	Tuesday	...	...	12 NOON to 1-30 P.M.
12 NOON to 1-30 P.M.	Wednesday	...	...	10-30 A.M. to 12 NOON
1-30 to 3 P.M.	Thursday	..	...	9 to 10-30 A.M.
10-30 A.M. to 12 NOON	Friday	...	...	7-30 to 9 A.M.
9 to 10-30 A.M.	Saturday	...	...	6 to 7-30 A.M.

PRICE LIST OF IMPLEMENTS

Rates are subject to Fluctuations

No.	Names of Implements				Amount		
					Rs.	a.	p.
1	K. M. ploughs	...	...	...	26	9	0
2	Eureka ploughs	...	...	...	22	12	0
3	Mysore ploughs	...	...	...	30	4	0
4	Gurjar ploughs	...	...	...	17	8	0
5	Thakur ploughs	...	...	...	62	7	0
6	K. M. Cultivator	...	...	...	26	9	0

PLOUGH PARTS

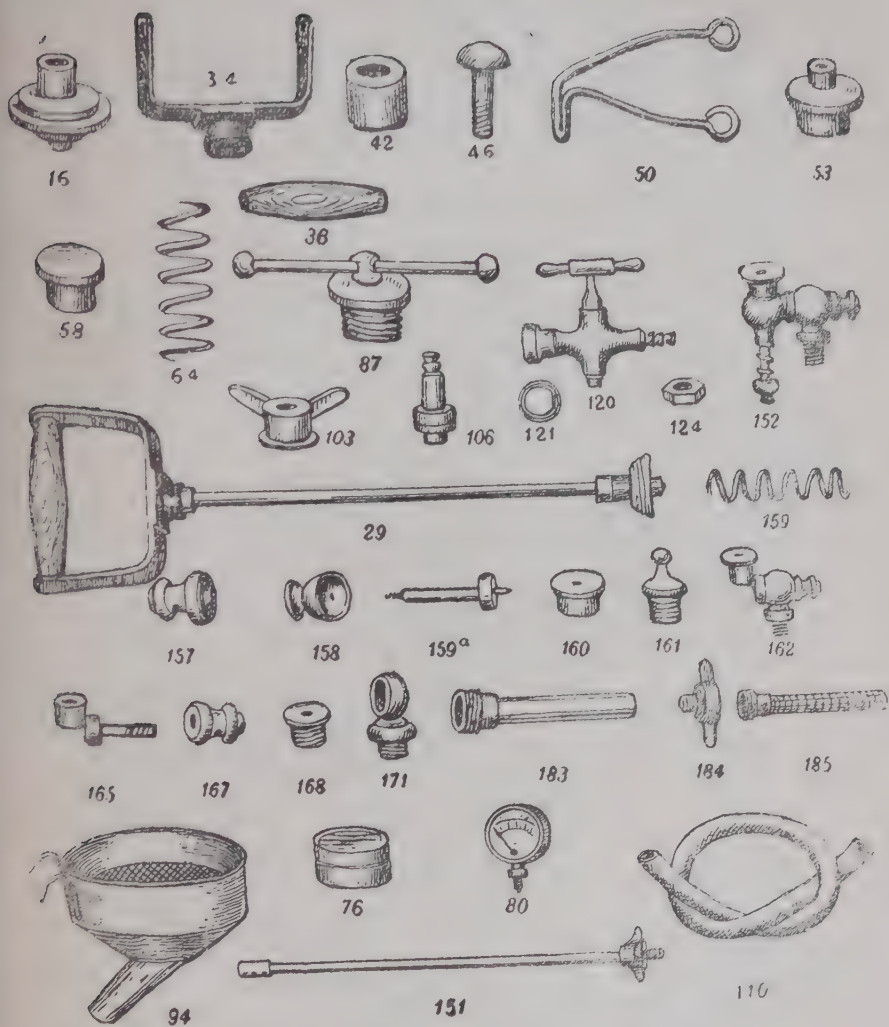
7	K. M. Steel shares	...	...	...	2	4	6
8	K. M. plough mould board	...	...	...	3	1	0
9	Mysore plough bar point	...	...	...	1	9	0
10	K. M. plough landside	...	...	...	1	9	0
11	Eureka mould board	...	...	...	1	4	0
12	Eureka plough points	...	...	...	1	9	0
13	Gurjar plough mould	...	...	...	1	14	0
14	Thakore shares	...	...	...	2	11	6
15	Thakore mould board	...	...	...	11	5	6
16	Mysore plough mould board	...	...	...	2	5	6
17	Eureka shares	...	...	...	1	2	6
18	Gurjar shares	...	...	...	1	3	0
19	Mysore mumty	...	...	...	3	14	0

CART MATERIALS

Particulars				Value of each		
20	M. S. Flats	$2\frac{1}{8}'' \times \frac{5}{8}'' \times 18'$	...	16	8	6
21	Do	$2\frac{1}{8}'' \times \frac{1}{2}'' \times 18'$	...	13	3	3
22	Do	$2\frac{1}{8}'' \times 9/16'' \times 18'$	...	14	13	6
23	Do	$1'' \times \frac{1}{4}'' \times 15'$	...	2	9	6
24	Do	$1'' \times \frac{1}{2}'' \times 18''$	...	6	3	6
25	Do	$1\frac{1}{4}'' \times \frac{3}{8}'' \times 18'$	...	5	13	3
26	Do	$1\frac{1}{2}'' \times \frac{3}{8}'' \times 18'$	...	6	15	9
27	Do	$1\frac{1}{4}'' \times \frac{1}{2}'' \times 18'$	...	7	12	9
28	Do	$1\frac{1}{2}'' \times \frac{1}{2}'' \times 18'$	...	9	5	3
29	Do	$1'' \times 5/16'' \times 15'$	...	3	3	9
30	Do	$1'' \times \frac{1}{4}'' \times 7\frac{1}{2}'$	...	1	4	9
31	Do	$1'' \times \frac{3}{8}'' \times 18'$	...	4	11	0
32	Do	$2'' \times \frac{1}{2}'' \times 18'$	...	12	7	0
33	Do	$2'' \times \frac{3}{8}'' \times 18'$	...	9	5	3
34	Do	$1\frac{3}{4}'' \times \frac{5}{8}'' \times 18'$	...	13	9	9
35	Do	$1\frac{3}{4}'' \times 9/16'' \times 18'$	...	12	4	0
36	Do	$1\frac{3}{4}'' \times \frac{3}{8}'' \times 18'$	...	8	2	6
37	Do	$1\frac{1}{2}'' \times \frac{1}{4}'' \times 18'$	...	4	11	0
38	Do	$1\frac{1}{4}'' \times \frac{1}{4}'' \times 18'$	...	3	14	3
39	Do	$1\frac{1}{4}'' \times \frac{1}{8}'' \times 18'$	...	1	15	3
40	Do	$1'' \times \frac{1}{4}'' \times 18'$	...	3	1	9
41	Do	$1'' \times 5/16'' \times 18'$	...	3	14	3
42	M. S. Rounds	$\frac{5}{8}'' \times 18'$	...	3	13	3
43	Do	$\frac{1}{2}'' \times 18'$	...	2	7	3
44	Do	$\frac{3}{8}'' \times 18'$	...	1	6	3
45	Do	$\frac{1}{4}'' \times 18'$	...	0	10	0
46	M. S. Squares	$2'' \times 2'' \times 4\frac{1}{2}'$	...	12	7	0
47	Do	$1\frac{3}{4}'' \times 1\frac{3}{4}'' \times 5'$	...	10	9	3

PRICE LIST OF SPARE PARTS FOR HOLDER SPRAYERS

Sl. No.	Part No. or Name					Amount		
						Rs.	a.	p.
1	Number	16	...	...	...	...	1	0 0
2	"	29	...	...	...	...	2	12 6
3	"	53	...	...	...	...	1	6 9
4	"	58	...	...	...	...	0	12 6
5	"	64	...	...	...	...	0	4 3
6	"	80	...	...	...	...	1	14 0
7	"	87	...	...	...	...	2	1 0
8	"	94	...	...	...	...	2	7 0
9	"	103	...	...	...	...	0	11 9
10	"	106	...	...	...	...	0	9 0
11	"	120	...	...	...	...	3	4 0
12	"	121	...	...	...	...	0	3 6
13	"	124	...	...	...	...	0	3 3
14	"	151	...	...	...	...	4	4 9
15	"	151A	...	...	...	...	2	4 0
16	"	152	...	...	...	...	1	0 0
17	"	157	...	...	...	...	0	6 6
18	"	160	...	...	...	...	0	9 0
19	"	161	...	...	...	...	0	9 3
20	"	168	...	...	...	...	0	6 9
21	"	183	...	...	...	...	2	6 3
22	"	184	...	...	...	...	1	3 6
23	"	185	...	...	...	...	1	0 3
24	Lid Washers					...	0	2 3
25	Washer sets—per set					...	0	8 0
26	Hose per foot					...	1	1 0
27	Number 162					...	1	12 0
28	Metal cap					...	0	5 0
29	Rubber bearing					...	0	4 0
30	Hose clips					...	0	6 3



Sprayer Parte.

STAFF OF THE AGRICULTURAL DAPARTMENT

- 1 Sri K. H. Srinivasan, M.A., B.Sc. (Edin.), Director of Agriculture on long leave from 9-12-1951.
Sri M. K. Appajappa, B.A., Offg. Director of Agriculture.
- 2 Dr. B. T. Narayanan, B.A., PH.D., D.I.C. Joint Director of Agriculture.
- 3 Sri D. R. Chennarudraiya, B.A., M.Sc., Headquarters Assistant to the Director of Agriculture,
- 4 Sri K. Narayana Rao, B.A., Accounts Assistant to the Director of Agriculture.
- 5 Sri M. L. Narasimha Iyengar, B.A., B.T., L.Ag. Technical Assistant.
- 6 Sri B. Srinivasiah, Manager, Office of the Director of Agriculture.
- 7 Sri Vasudevamurthy, B.Ag., Secretary, The Mysore Agricultural and Experimental Union, Kannada Agricultural Schools Examination Board, Incharge of Kannada Publications.
- 8 Sri M. Subbiah, B.A., Bio-chemist, Compost Scheme.
- 9 Sri N. V. Gopal Murthy, B.E., Agricultural Engineer.
- 10 Sri Samuel Dhanaraj, B.E. Tractor Engineer.
- 11 Sri A. Ananthapadmanabha Rao, B.A., M.S. (Iowa), Statistician and Meteorologist.
- 12 Sri M. L. Subbanna, B.Sc. (Hons.), Senior Assistant Director of Agriculture O.O.D. in Mysore Tobacco Co.
- 13 Janab H. A. Abdul Rubb, B.Sc., Senior Assistant Director of Agriculture, Incharge of Babboor Farm.
- 14 Sri B. Rudramurthy, M.Sc., M.S., Senior Assistant Director of Agriculture, Bangalore.
- 15 Sri B. P. Balakrishna, B.Sc. (Edin.), Assistant Director of Agriculture, Hassan.
- 16 Sri C. M. Revanna, B.Sc. (Hons.), Assistant Director of Agriculture, Mysore.
- 17 Sri H. C. Nanjiah, B.Sc., Assistant Director of Agriculture, Kolar.
- 18 Sri Y. R. Narayana Rao, L.Ag., Assistant Director of Agriculture, Chikmagalur.
- 19 Sri C. Ramiiah, L.Ag., Assistant Director of Agriculture, Mandya.
- 20 Sri G. V. B. Naidu, B.Sc. (Hons.), Assistant Director of Agriculture, Shimoga.
- 21 Sri K. Basavaraja Urs, L.Ag., Assistant Director of Agriculture, Tumkur.
- 22 Sri S. V. Haridas, L. Ag., (incharge) Assistant Director of Agriculture, Chitaldrug.
- 23 Sri V. S. Ponnurangam, L.Ag., Gazetted Officer incharge, Visvesvaraya Canal Farm.
- 24 Sri T. C. Thimmiah, L.Ag., Assistant Director of Agriculture, O.O.D. Arsikere Cotton Co-operative Society.
- 25 Sri K. Nagesh Rao, L.Ag., Assistant Director of Agriculture, incharge, Central Farm, Hebbal.
- 26 Sri M. Narayanappa, L.Ag., Headmaster, Ramakrishna Krishisala, Anekal, Bangalore District.
- 27 Sri K. Ramachandra Iyer, L.Ag., Headmaster, Agricultural School, Garudapalya, Kolar District.

- 28 Sri S. L. N. Murthy, L.Ag., Headmaster, Sri Krishnarajendra Vyavasaaya Dharma Pathasala, Chikkanahally, Sira Taluk.
- 29 Sri S. K. Kenchiah, L.Ag., Headmaster, Agricultural School, Somana-hally, Maddur P.O.
- 30 Sri R. Vijendraswamy, B.Sc. (Agri.), Agricultural Inspector, Demonstration Plots.
- 31 Sri R. M. Reddi, L.Ag., Agricultural Inspector, Grow More Food Campaign.
- 32 Sri J. Aswathanarayana Rao, L.Ag., Agricultural Inspector, Central Implement Depot.
- 33 Sri P. R. Raghuram Pillay, Photographer and Artist.
- 34 Sri M. S. Sankarlingiah, L.Ag., Agricultural Inspector, Basic Farm, Mysore District.
- 35 Sri N. Suryanarayana Rao, L. Ag., Agricultural Inspector, Basic Farm, Bangalore District.
- 36 Sri B. S. Shama Rao, L.Ag., Agricultural Inspector, Basic Farm Chikmagalur District.
- 37 Sri K. Anantharaja Urs, L.Ag., I.D.D., Agricultural Inspector, Basic Farm Amruthur, Tumkur District.
- 38 Sri G. N. Alasingrachar, B.Sc., B.Sc. (Agri.), Agricultural Probationer.
- 39 Sri Y. Chandrasekhar, B.Sc. B.Sc. (Agri.), do
- 40 Sri B. P. Venkataramiah, B.Sc., B.Sc. (Agri.), do
- 41 Sri N. Narasimhiah, B.Sc., B.Sc. (Agri.), do
- 42 Sri P. Basaviah, B.Sc. (Agri.), do
- 43 Sri H. V. Puttanaik, B.Sc. (Agri.), do
- 44 Sri R. Dwarakanath, B.Sc. (Agri.), do
- 45 Sri B. J. Nanjundappa, B.Sc., B.Sc. (Agri.), do
- 46 Sri C. Gopalkrishna, B.Sc. B.Sc. (Agri.), do
- 47 Sri H. Mahadeviah, B.Sc., M.Sc. (Agri.), do

The Agricultural ranges in the Districts are in charge of Agricultural Inspectors of the respective ranges.

The plant protection work in each District is incharge of the Plant Protection Assistant of that District.

The Agricultural College and School at Hebbal and the Hebbal Farm are under the control of the Principal, Agricultural College.

The Nagenhally Farm and Scientific Sections are under the control of the Director of Agriculture and I/c Director of Agricultural Research.

The Live-Stock Farms and the Veterinary and Animal Husbandry establishment are under the Director of Animal Husbandry Services.

STAFF OF THE DEPARTMENT OF HORTICULTURE

BANGALORE

- Dr. M. H. Marigowda, M.Sc. (Luck.) Ph.D. (Harvard,) Superintendent, Govt. Gardens and Hill Stations and Chairman, Mysore Horticultural Society.
- Sri K. V. Venkat Gowda, B.A., Assistant Superintendent, Parks and Gardens Bangalore, and Secretary, Mysore Horticultural Society, Bangalore.
- Sri B. G. Gupta, Apiarist.
- Sri P. V. Ramakrishna, B.A., Manager, Office of the Superintendent, Government Gardens, Lalbagh, Bangalore.
- Sri D. N. Krishna Rao, Inspector, Mysore Horticultural Society.
- Sri M. S. Shankarappa, District Horticultural Inspector, Bangalore.
- Sri M. Krishnamurthy Naidu, Supervisor, Lalbagh.
- Sri Vishnudas Ramadas, Artist, Lalbagh.
- Sri M. T. R. Cruz, Draftsman.
- Sri M. C. Mastegowda, B.Sc., Librarian.
- Sri M. Thomas Royar, Curator, Lalbagh.
- Sri M. R. Anandaramiah, M.Sc., Prob. Curator, Lalbagh.
- Sri Y. Muniyappa, Plant Propagator, Lalbagh.
- Sri S. N. Nijah, Plant Disease Inspector, Lalbagh.
- Sri N. Thimmappiah, Lalbagh Overseer.
- Sri M. Muniswamiah, Overseer, Sri Chamarajendra Park.
- Sri K. L. Malligegowda, Central Circle Overseer.
- Sri J. G. Chunchiah, Northern Circle Overseer.
- Sri B. M. Arogyappa, Southern Circle Overseer.
- Sri M. Rangaswamy, Manager, Koramangala Horticultural Farm.
- Sri S. Gopal, Foreman, do

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- Sri K. Dejushetty, B.Sc. (Agri.), Asst. Superintendent, Parks and Gardens Seringapatam.
- Sri C. Raghunatha Rao, Horticultural Inspector, Brindavan Gardens and Orchard, Krishnarajasagara.
- Sri C. S. Sundaram, Overseer, Dar-i-Dowlat Bagh.
- Sri Sreenivasiah, Foreman, Fig Demonstration Farm, Ganjam.
- Sri B. L. Krishnamurthy, Foreman, Orchard, Krishnarajasagara.
- Sri V. Rangiah, District Horticultural Inspector, Mandya.
- Sri V. C. T. Royan, Plant Propagator, Mandya.
- Sri Y. Papanna, Manager, Horticultural Farm, Maddur.

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- Sri S. Narasinga Rao, B.Sc. (Hons.), Asst. Superintendent, Parks and Gardens, Mysore.
- Sri R. Veeraraj Urs, Supervisor, His Highness the Maharaja's Own Infantry Gardens, Mysore.
- Sri M. Subbuswamy, Overseer, Lalithamahal Gardens.
- Sri B. G. Rupanatha Rao, Southern Circle Overseer.
- Sri Nanjundiah, Plant Disease Inspector.

Sri R. Kapiniah, Overseer, Curzon Park.

Sri J. Javarayi Gowda, Overseer, Govt. House.

Sri G. K. Venkatesiah, Overseer, Palace Gardens.

Sri Rangiah, do

Sri Y. Satyanarayana Rao, do

Sri Om Namasivaya, do

Sri C. Muddappa, Overseer, Gordon Park.

Janab Inayatullah Sheriff Khuraishi, District Horticultural Inspector, Mysore District.

Sri M. K. Subba Rao, Plant Propagator.

Sri M. V. Anantharamiah, B.A., Curator, Sri Chamarajendra Zoological Gardens, Mysore.

HASSAN DISTRICT.

Sri T. M. Mallikarjunaappa, District Horticultural Inspector.

Sri D. S. Vodgaliah, Plant Propagator.

CHIKMAGALUR DISTRICT

Sri P. N. Padmanabha Chetty, District Horticultural Inspector.

Sri B. S. Onkara Setty, Plant Propagator.

SHIMOGA DISTRICT.

Sri K. Krishna Sastry, District Horticultural Inspector.

Sri M. Papiiah, Plant Propagator.

CHITALDRUG DISTRICT

Janab H. Hassan Peer.

Sri K. Kondappa, Plant Propagator, Iyyanahalli.

TUMKUR DISTRICT

Sri S. P. Rudriah, District Horticultural Inspector.

Sri R. S. Krishnaswamy, Plant Propagator.

KOLAR DISTRICT

Sri Y. Venkatesiah, District Horticultural Inspector.

Janab Abdul Jabbar Sheriff, Plant Propagator.

HILL STATIONS

Nandi Hill Station : Sri B. A. Channappa, Supervisor.

Sri M. S. Armugham, Steward.

Sri Krishnarajendra Hill Station :

Sri D. K. Naganna, Supervisor.

[The following text is extremely faint and largely illegible due to the quality of the scan. It appears to be a series of lines of text, possibly a list or a narrative, but the specific words and sentences cannot be accurately transcribed.]

THE MYSORE AGRICULTURAL AND EXPERIMENTAL UNION

No. 5/1, JAYACHAMARAJENDRA ROAD, BANGALORE 2,

YOUNG FARMERS' CLUBS

A BEGINNING HAS ALREADY BEEN MADE IN MYSORE

(Continued from the front Cover page 2)

And to the Younger One

In the city or in the village, you can be a member
of a Young Farmers' Club.

Work at some job—grow some crop.

• Grow with the club and make the club grow with
you.

And sing with your brothers and sisters :

• My hands to harder work ;

My head to clearer thinking ;

My heart to better brotherhood ;

My health to the good of my society !

(On the lines of the American motto)

Remember :

The plant that a young hand grows

Lifts its leaves in prayer to god

And when it yields its wholesome fruit

It has the taste of heaven withit.

The pets you have, horned or otherwise.

They stand for a prize and grow clubwise.

Why Indian Farmers use Ferguson Tractors



Only with the aid of machinery can farmers grow sufficient food to meet India's needs. And this machinery must be cheap to buy, easy to use, and above all, simple to maintain. Farmers with Ferguson tractors and implements recommend them because they meet all these requirements, and are backed by the finest maintenance service in India.

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